Ephemerides. &c.
756.a. 2
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14

THE Gentleman's Diary, OR THE MATHEMATICAL REPOSITORY;

An ALMANACK For the YEAR of our LORD 1764.

BEING
BISSEXTILE, or LEAP-YEAR.

Containing many uſeful and entertaining Particulars, peculiarly adapted to the ingenious Gentlemen engaged in the delightful Study and Practice of the
MATHEMATICKS.

The Twenty-fourth *Almanack* publiſhed of this Kind;
and the Twelfth of the NEW STYLE in ENGLAND.

——— With wiſe Intent
The Hand of Nature on peculiar Minds
Imprints a diff'rent byaſs, and to each
Decrees its Province in the common Toil.
To ſome ſhe taught the Fabric of the Sphere,
The changeful Moon, the Circuit of the Stars,
The golden Zones of Heav'n: to ſome ſhe gave
To weigh the Moment of eternal Things,
Of Time, and Space, and Fate's unbroken Chain,
And Will's quick Impulſe.———

Printed for the Company of STATIONERS.
M.DCC.LXIV.
[Price Nine-pence ſtitch'd]

To the PUBLICK in general, but more particularly to the ingenious CONTRIBUTORS to the GENTLEMAN's DIARY.

WHEREAS in the Year 1761, in order to oblige and encourage you all; it was propoſed to give an annual PRIZE of Twelve Diaries, to ſuch Contributor as ſhould ſend the beſt Mathematical or Poetical Performances to this Work: Accordingly it was then ordered, that Mr. GEO. BROWN, Teacher of the Mathematicks on *Portſmouth Common*, ſhould have twelve Diaries ſent to him from Stationers-Hall, who was at that time diſappointed, and which gave the Author no ſmall Concern: But having now prevailed with the Worſhipful Company, yearly to allow three Dozen Diaries to be diſpoſed of as Prizes, which ſhall hereafter be done with the utmoſt Impartiality upon this footing, (*viz.*) As Mr. GEO. BROWN was ſo diſappointed as aforeſaid, deſire he will accept of twelve Diaries *this* Year, and alſo generouſly excuſe the paſt Omiſſion: And that Mr. JOHN METCALFE, of *Wentworth-Houſe* in *Yorkſhire*, will accept of twelve Diaries more, as a grateful Acknowledgment of his indefatigable Induſtry in calculating the Eclipſes, *&c.* And the other twelve, in two equal Shares of ſix Diaries each, to Mr. WILLIAM KINGSTONE of *Bath*; to whom the Author is under great Obligations as a conſtant and worthy Contributor: And the other ſix, to the much deſerving Mr. THOMAS HARRIS of *Bugbrook* in *Northamptonſhire*.

And with regard to the future Diſpoſal of the Prizes; preſume the following Method will not be diſagreeable (viz.) *twelve Diaries to him who ſhall ſend the beſt Solution to the 12th Queſtion* (No. 264) *and twelve more, to whoever ſhall ſend the beſt general Poetical Anſwer to all the Ænigmas: And the other two equal Shares of Six Diaries each, to them whoſe Mathematical, Philoſophical, or Poetical Performances ſhall be found moſt deſerving (under the two firſt) in every Year.*

The Author alſo returns ſincere Thanks, to Mr. THOMAS WALKER, *of* Stanton Bury, *near* Newport Pagnel, Bucks. *not only for his Advice, (which he will endeavour to follow) but, for his kind Encouragement to the Work, &c. And hopes to make it conſtantly anſwer the End it was originally deſigned for, and give the deſired Satisfaction to the Publick in general; as well as to the worthy and ingenuous Contributors in particular; but more eſpecially to, Gentlemen, Your moſt obliged humble Servant,*

The EDITOR.

All Perſons who pleaſe to be Contributors *to this* DIARY, *by anſwering the* Queſtions, Ænigmas, *&c. or by ſending new ones, or any other entertaining and improving* Subjects *proper for the* WORK: *are (once more) earneſtly deſired to ſend* them, *and their* Solutions *along with them, before the firſt Day of* May 1764, *directed, for the* Author *of the* Gentleman's Diary, *and to be left with* THO. PEAT, School-maſter, *and* Surveyor, *in* Nottingham (Poſt paid) *or they will not be received.*

JANUARY hath xxxi Days

M D	☉ Decl. South.	
1	23°	3
6	22	33
11	21	52
16	21	0
21	19	58
26	18	47

New Moon the 3d	Day at	10 in the Morning.
First Quarter the 11th		5 in the Morning.
Full Moon the 18th		Midnight.
Last Quarter the 25th		10 at Night.

1	A	Circumcision. Sund. after Chriſt. day.	6M	36	10 M	4
2	M	The Days are ſhort, tho' a little upon	7	53	11	5
3	Tu	the Increaſe: *and if the Weather hap-*	☽ Sets		0 A	6
4	W	*pen to be very cold and dirty, is not at all*	4A	50	1	4
5	Th	*unſeaſonable.* OLD CHRISTMAS-DAY	6	9	1	57
6	F	Epiphany. CHRIST's ✻ app. to Gent.	7	29	2	40
7	S	(*Saliſbury*, Wiltſhire the 6th)	8	44	3	28
8	A	1 Sunday after Epiphany.	9	55	4	8
9	M	Canterbury.	11	5	4	48
10	Tu	Days increaſed, and conſequently the	Morn		5	26
11	W	Nights are ſhortened about 26 Min.	0	15	6	6
12	Th	OLD NEW-YEARS DAY.	1	24	6	46
13	F	Hilary, Biſh. & Con. *Preſton*, Lanc.	2	37	7	31
14	S	Day 8 hours 16 min. long.	3	52	8	20
15	A	2 Sunday after Epiphany.	5	9	9	12
16	M	Day-light begins 49 min. paſt 5	6	18	10	8
17	Tu	(Old Tw. Day.) *Taviſtock*, Devon.	7	19	11	6
18	W	Q. CHARLOT's Birth-day kept.	Riſes		Morn.	
19	Th	☉ ♒ 23 hours 3 min. app. time	4A	38	0	4
20	F	In 8 Days of St. Hilary. *Nottingham.*	6	5	0	59
21	S	Agnes, Rom. V. & M.	7	32	1	51
22	A	3 Sunday after Epiphany.	8	57	2	40
23	M	Term begins	10	22	3	28
24	Tu	*Derby.*	11	47	4	16
25	W	Converſion of St. PAUL.	Morn		5	5
26	Th	Days increas'd 1 hour and a quarter.	1	15	5	54
27	F	From the Day of St. Hil. in 15 Days.	2	43	6	47
28	S	Duration of Twilight 2 Hours.	4	10	7	45
29	A	4 Sunday after Epiphany.	5	30	8	44
30	M	K. CHARLES I. Mart. 1648.	6	37	9	45
31	Tu	(at Whitehall, 12 m n. paſt 1.)	7	17	10	43

M D	☉ Riſes		☉ Sets		♄ Sets.		♃ Set		♂ Riſe		♀ Sets		☿ Sets.		Cl. e. ☉	
1	8h	4'	3h	56'	2 M	7	5 A	41	2 M	2	5 A	13	3 A	52	4	1"
6	8	1	3	59	1	42	5	11	1	54	5	28	4	16	6	18
11	7	56	4	4	1	10	4	50	1	49	5	41	4	40	8	25
16	7	50	4	10	1	0	4	31	1	44	5	55	5	04	10	17
21	7	44	4	16	0	40	4	21	1	39	6	13	5	28	11	50
26	7	36	4	24	0	24	3	51	1	34	6	24	5	56	13	[illegible]

FEBRUARY hath xxix Days.

New Moon the 2d Day at 1 in tha Morning.
First Quarter the 10th Day at 3 in the Morning.
Full Moon the 17th Day at 1 in the Afternoon.
Laſt Quarter the 24th Day at 6 in the Morning.

M D	☉ Decl. South.
1	17° 10′
6	15 41
11	14 6
16	12 25
21	10 38
26	8 48

M D	W D	Sundays, Holy and remarkable Days; Length, Inc. & Dec. Terms, Fairs, &c.	☽ Riſes & Sets.	Moon South.
1	W	*Burton*, Lanc. *Lynn*, Norf. *Leominſt*. (*Faſt*	7 M 48	11 M 37
2	Th	Purif. B. V. Mary, Candlemas Day	☽ Sets.	0 A 28
3	F	On the Morrow of the Purif. B. M.	6 A 15	1 13
4	S	Day breaks 25 min. paſt 5.	7 30	1 56
5	A	5 Sunday after Epiphany.	8 42	2 37
6	M	Day 9 hours 26 min. long, and are	9 52	3 15
7	Tu	now increaſed 1 hour 42 min.	11 2	3 54
8	W	Duration of Twilight is 2 hours	Morn.	4 36
9	Th	In eight Days of the Purif. B. V. M.	0 14	5 19
10	F	*The Weather is like enough to be very dif-*	1 28	5 5
11	S	*ferent in diſtant, and different Places*, &c	2 42	6 55
12	A	6 Sunday after Epiphany.	3 56	7 49
13	M	Term Ends. Old Candlemas Day	5 1	8 45
14	Tu	Valentine Biſh. & M.	5 53	9 43
15	W	*Flint*. *Bromley*, Kent.	6 30	10 41
16	Th	Days are encreaſing apace, being 10	6 56	11 36
17	F	hours and 2 minutes long.	☽ Riſes	Morn.
18	S	☉ in ♓ 13 hours 53 min. app. time.	6 A 31	0 27
19	A	Septuageſima Sunday.	8 0	1 19
20	M	Days are now encreaſed 2 h. 36 m.	9 29	2 8
21	Tu	*Norton*, Oxfordſhire.	10 57	2 58
22	W	*Godalming*, Surrey.	Morn.	3 49
23	Th	Twilight begins 55 min. after 4 (*Faſt*.	0 28	4 42
24	F	St. MATTHIAS, A. and M.	1 58	5 39
25	S	*Feverſham*, Kent.	3 21	6 39
26	G	Sexageſima Sunday.	4 30	7 39
27	M	*Oundle*, Northamptonſhire.	5 18	8 38
28	Tu	*Cheſterfield*, Derbyſhire.	5 53	9 34
29	W	Leap Day.	6 16	10 24

M D	☉ Riſes	☉ Sets	♄ Sets.	♃ Sets.	♂ Ris.	♀ Sets.	☿ Sets	Cl. bef. ☉
1	7h 26	4 34	11 A 56	3 M 23	1 M 27	6 A 44	6 A 19	14′ 8″
6	7 18	4 43	11 37	3 2	1 22	7 0	6 11	14 38
11	7 9	4 52	11 21	2 45	1 17	7 15	6 0	14 46
16	7 0	5 1	11 05	2 28	1 11	7 31	Riſes	14 38
21	6 50	5 11	10 49	2 11	1 5	7 46	6 M 15	14 9
26	6 41	5 20	10 33	1 54	1 0	8 2	5 49	13 25

MARCH hath xxxi Days.

New Moon the 2d	Day at	5 in the Afternoon.
Firſt Quarter the 10th		10 at Night
Full Moon the 17th		Midnight.
Laſt Quarter the 24th		3 in the Afternoon.

M D	☉ Decl. South	
1	7°	17
6	5	22
11	3	25
16	1	26
21	0 N	32
26	2	30

1	Th	David, Archb. Menev.	6M	32	11 M	10
2	F	Cedde or Chad. B. Litc.	☽ Sets		11	53
3	S	Sun's riſing Ampl. 3 deg. 38 m. South.	6A	28	0A	35
4	G	Quinquageſima, Shrove Sunday.	7	39	1	15
5	M	Princeſs HESSE born.	8	51	1	54
6	Tu	Shrove Tueſday.	10	3	2	36
7	W	Aſh Wedneſ. 1ſt Day of Lent *Notting.*	11	16	3	17
8	Th	Day 11 h. 26 min. long; therefore the	Morn.		4	2
9	F	Night muſt be about 12 h. and 34 m	0	30	4	50
10	S	Days encr. 3 hours and above 3 qrs.	1	45	5	42
11	G	Quadrageſima. 1ſt Sunday in Lent.	2	52	6	36
12	M	Greg. M. B. of R. & C.	3	49	7	34
13	Tu	Duration of Twilight is 1 hour 57 m.	4	32	8	31
14	W	Ember Week.	5	2	9	25
15	Th	*Oakham*, Rutlandſh. *Langadock*, Caerm.	5	24	10	18
16	F	*Penzance*, Cornwall.	5	40	11	11
17	S	*Malmeſ*, Wilts. *Hariff*, Hunt. M. Ecl. viſ.	☽ Riſes		Morn.	
18	G	Reminiſcere. 2d Sunday in Lent.	7 A	5	0	1
19	M	☉ in ♈ 14 hours 27 min. app. time	8	37	0	52
20	Tu	Equal Day and Night.	10	12	1	45
21	W	Benedict. Abbot.	11	46	2	40
22	Th	Days encreaſed 4 hours 34 min.	Morn.		3	39
23	F	*Woburn*, Bedf. *Wrexham*, Denb.	1	15	4	40
24	S	*Llanerchemith*, Caerm. (*Faſt.*	2	30	5	40
25	G	3 Sun. in Lent. Ann. B. V. M. D. York b	3	26	6	40
26	M	*Glouceſter*. *Namptwich*. *St. Albans*.	4	5	7	37
27	Tu	*Atherſtone*, War. *Preſton*, Lanc.	4	30	8	28
28	W	*Cobham*, Surrey, *Patrington*, Yorkſh	4	49	9	17
29	Th	*Yarm*, Yorkſh. *Stourbridge*, Worceſt.	5	2	10	1
30	F	Day 12 hours and 48 min. long.	5	12	10	41
3	S	City of *Durham*, laſt 3 Days.	5	23	11	22

M D	☉ Riſes	☉ Sets	♄ Sets	♃ Sets	♂ Riſes	♀ Sets	☿ Riſes	Cl. bef. ☉
1	6h 33'	5h 28	10A 16	1 M 38	0 M 53	8 A 18	5 M 38	12' 41"
6	6 23	5 38	10 1	1 24	0 46	8 34	5 34	11 32
11	6 13	5 48	9 47	1 10	0 39	8 51	5 30	10 12
16	6 3	5 58	9 32	0 56	0 32	9 7	5 26	8 46
21	5 53	6 8	9 18	0 42	0 25	9 24	5 22	7 15
26	5 43	6 18	9 3	0 28	0 18	9 41	5 18	5 40

APRIL hath xxx Days.

New Moon the 1st } Day at { 11 in the Morning.
First Quarter the 9th } Day at { 2 in the Afternoon.
Full Moon the 16th } Day at { 9 in the Morning.
Last Quarter the 23d } Day at { 2 in the Morning.

M D	☉ Decl. North.	
1	4°	50′
6	6	44
11	8	36
16	10	23
21	12	7
26	13	45

1	G	4 Sun. in Lent. Midlent S. ☉ ecl. viſ.	6 M	32	11 M	10
2	M	*Lutterworth*, Leiceſterſh. *Saliſb.* Wilts.	☽ Sets		11	53
3	Tu	Richard Biſh. of Chich.	6 A	28	0 A	35
4	W	S. Ambroſe, B. of Mil.	7	39	1	15
5	Th	Old Lady Day.	8	51	1	54
6	F	*Epping*, Eſſex. *Rochford*, Eſſex.	10	3	2	36
7	S	*Atherſtone*, Warwickſh.	11	16	3	17
8	G	Judica. 5 Sunday in Lent	Morn.		4	2
9	M	Day-light begins 12 min. after 3	0	30	4	50
10	Tu	Day 13 hours 32 min long.	1	45	5	42
11	W	*Newport Pagnel*, Bucks.	2	52	6	36
12	Th	*Hickford*, Hampſhire.	3	49	7	34
13	F	☉ due E. 6 ho. 35 m.	4	32	8	31
14	S	Days are now increaſed 6 h 2 min.	5	2	9	25
15	G	Palm Sunday. 6 Sund. in Lent	5	24	10	18
16	M	*Derby*, *Dilton's-Marſh*, W. *Piddle-down*,	5	40	11	11
17	Tu	*Malmſbury*, Wilts.	☽ Riſes		Morn.	
18	W	*Cobham*, Surrey.	7 A	5	0	1
19	Th	☉ in ♉ 3 h. 27 m. app. time. *Nott.*	8	37	0	52
20	F	Good Friday	10	12	1	45
21	S	*Modbury*, Devonſh. *Rumney*, Kent.	11	46	2	40
22	G	Eaſter Day; Our SAVIOUR's Reſurr.	Morn.		3	39
23	M	Eaſter Monday. St. George.	1	15	4	40
24	Tu	Eaſter Tueſday.	2	30	5	40
25	W	St. Mark, Evangeliſt.	3	26	6	40
26	Th	Duke of CUMBERLAND born	4	5	7	37
27	F	*Boroughbridge*, Yorkſh. *Derby* moveable	4	30	8	28
28	S	*Soham.* Camb. *Northampton*, Pilton.	4	49	9	17
29	G	Low Sunday. 1 Sunday after Eaſter	5	2	10	1
30	M	Day 14 hours 3 quar. long.	6	12	11	28

A D	☉ Riſes	☉ Sets	♄ Sets.	♃ Sets	♂ Riſes	♀ Sets	☿ Riſes	C. bet. ☉
1	5h 31	6h 30	8 A 43	0 M 7	0 M 5	10 A 5	5 M 12	3′ 49″
6	5 21	6 40	8 29	11 A 48	11 A 49	10 19	5 5	2 19
11	5 12	6 49	8 14	11 35	11 36	10 34	4 58	0 54
6	5 2	6 59	8 0	11 2	11 21	10 48	3 0	0 aft. 24
1	4 53	7 8	7 45	11 10	11 12	11 3	Sets	1 31
6	4 44	7 17	7 31	12 55	10 55	11 17	7 A 24	2 27

MAY hath xxxi Days.

		Day at	
New Moon	the 1ſt		4 in the Morning.
Firſt Quarter	the 9th		1 in the Morning.
Full Moon	the 15th		5 in the Afternoon.
Laſt Quarter	the 22d		3 in the Afternoon.
New Moon	the 30th		7 in the Afternoon.

M D	☉ Decl. North.	
1	15°	18′
6	16	45
11	18	5
16	19	17
21	20	21
26	21	16

1	Tu	St. Ph. and Jac. May Da *Wickſworth*	8	A20	0	A11
2	W	*Lancaſter*, *Brecknock*.	9	35	0	58
3	Th	Invention of the Croſs.	10	46	1	46
4	F	*Bewdley*, Worc. *Boſton*, Linc. *Graveſ.* K.	11	48	2	38
5	S	*Montgomery*. *Lowth*, Linc.	Morn.		3	32
6	G	2 Sunday after Eaſter.	0	38	4	26
7	M	From the Day of Eaſter in 15 Days	1	16	5	20
8	Tu	*Philip's Norton*, Somerſetſhire.	1	44	6	11
9	W	Term begins. *Market Boſworth*, Leic.	2	3	7	0
10	Th	*Fringe*, Norf. *Higham Ferrers*, North.	2	19	7	49
11	F	Day 15 hours 24 min. long	2	32	8	37
12	S	OLD MAY DAY. *Leiceſter*,	2	44	9	26
13		3 Sunday after Eaſter.	2	56	10	18
14	M	From the Day of Eaſter in 3 Weeks.	3	11	11	14
15	Tu	*Chapel in-le-frith*, Derb. *Chatham*, K.	☽ Riſes		Morn.	
16	W	Queen CHARLOTTE born.	9A	53	0	14
17	Th	*Brentford*, Midd. *Holbeach*, Linc.	11	10	1	18
18	F	*Hateſbury*, Bucks. *Thunderley*, Eſſex.	Morn.		2	24
19	S	Dunſtan, Archb. Cant.	0	8	3	27
20	G	4 Sund. aft. Eaſt. ☉ II. 4. h. 21. m. app. t.	0	45	4	24
21	M	From the Day of Eaſter in 1 Month	1	10	5	18
22	Tu	*Albrighton*, Shropſh.	1	26	6	6
23	W	*Bagborough*, Som. *Graies*, Eſſex.	1	39	6	49
24	Th	Pr. WILLIAM FRED. born, 1750	1	49	7	29
25	F	No real Night, but all Twilight.	1	57	8	8
26	S	Aug. firſt Archbiſhop of Canterbury.	2	7	8	51
27	G	5 Sund. after Eaſter, Rogat. Sunday	2	17	9	34
28	M	From the Day of Eaſter in 5 Weeks	2	29	10	17
29	Tu	King CHA. II. Birth and Return.	2	45	11	3
30	W	Rogation Week.	☽ Sets		11	49
31	Th	Holy Thurſday, CHRIST's Aſcenſion	9A	40	0A	2

MD	☉ Riſes		☉ Sets		♄ Riſes		♃ Sets		♂ Riſes		♀ Sets		☿ Sets.		Cl. aft. ☉	
1	4h	35	7h	26	4	M49	10A	42	10A	37	11 A	31	8 A	21	3′	12
6	4	27	7	34	4	30	10	31	10	15	11	33	8	43	3	44
11	4	19	7	42	4	13	10	16	9	54	11	3	9	04	4	0
16	4	11	7	50	3	55	10	2	9	32	11	[illegible]	9	26	4	2
21	4	4	7	57	3	38	9	47	9	11	11	[illegible]	9	47	3	50
26	3	58	8	2	3	[illegible]	9	[illegible]	8	[illegible]	11	[illegible]	10	9	3	[illegible]

JUNE hath xxx Days.

First Quarter the 7th } Day at { 9 in the Morning.
Full Moon the 13th } Day at { Midnight.
Last Quarter the 21st } Day at { 6 in the Morning.
New Moon the 29th } Day at { 8 in the Morning.

M D	☉ Decl. North.	
1	22°	11′
6	22	45
11	23	10
16	23	25
21	23	29
26	23	23

1	F	On the Morrow of the Aſcenſion.	10A	35	1 A	26
2	S	*Daventry*, Northamp. *Mark. Jew.* Cor.	11	17	2	21
3	G	6 Sunday after Eaſter.	11	46	3	14
4	M	King GEORGE III. b. 1738. Term Ends.	Morn.		4	5
5	Tu	Bonif. B. of Mentz. M.	0	5	4	54
6	W	Days 16 hours, and 26 min. long.	0	22	5	42
7	Th	*Montgomery*. *Stow*. in *Guillam*, Suff.	0	36	6	29
8	F	*St. Germains*, Cornwall.	0	47	7	14
9	S	*Hadderfield*, Suſſex.	0	59	8	3
10	G	Whit-Sunday. Prs. AMELIA SOPHIA b.	1	12	8	56
11	M	Whit-Monday. St. Barnabas, Ap. & M.	1	29	9	52
12	Tu	Whit-Tueſday. *Newark*, on Trent.	1	50	10	53
13	W	Ember Week. *Lenton*, Nottinghamſh.	2	23	11	58
14	Th	*Bangor*, Cornwall.	☽ Riſes		Morn.	
15	F	*Royſton*, Somerſet. *Derby* (moveable)	10 A	36	1	3
16	S	*Wrexham*, Denb.	11	5	2	5
17	G	Trinity Sunday.	11	24	3	1
18	M	On the Morrow of the Holy Trinity.	11	40	3	52
19	Tu	*Ingleton*, Yorkſhire.	11	50	4	38
20	W	☉ in ♋ 13 h. 21 min. app. time	12	0	5	20
21	Th	Longeſt Day, 16 hours 34 min. long.	Morn.		6	0
22	F	Term begins.	0	10	6	40
23	S	*Armington*, Devonſhire. (*Faſt*.	0	20	7	19
24	G	1 Sund. aft. Trinity. Nativ. St. Jo. Bap.	0	31	8	0
25	M	In 8 Days of the Holy Trinity.	0	46	8	45
26	Tu	*Chapel-Silvas*, Kent. *Penſhore*, Worc.	1	4	9	32
27	W	*Boſton*, Linc. *Burton*, on Trent, Staff	1	30	10	22
28	Th	*Folkſtone*, Stow-Green. *Faſt*.	2	9	11	13
29	F	St. Peter Ap. & M.	☽ Sets		0 A	8
30	S	*Bridgenorth*, Shropſh.	9A	43	1	4

M D	☉ Riſes		☉ Sets		♄ Riſes		♃ Sets		♂ Sets		♀ Sets.		☿ Sets.		Cl. aft ☉	
1	3h	52′	3h	9′	2 M	54	9 A	12	3 M	45	11 A	34	9 A	50	2′	39″
6	3	47	8	13	2	36	8	54	3	19	11	22	9	20	1	50
11	3	45	8	15	2	18	8	36	2	53	11	10	8	30	0	52
16	3	44	8	16	2	0	8	20	2	28	10	59	8	10	0 bef.	10
21	3	43	8	17	1	41	Riſes		2	02	10	47	Riſes		1	14
26	3	44	8	16	1	22	1 M	2[illegible]	1	37	10	3	3 M	35	2	17

JULY hath xxxi Days.

First Quarter the 6th	Day at	3 in the Afternoon.
Full Moon the 13th		8 in the Morning.
Last Quarter the 20th		10 at Night.
New Moon the 24th		8 at Night.

M D	☉ Decl North..	
1	23°	7′
6	22	40
11	22	4
16	21	19
21	20	24
26	19	21

1	G	Sunday after Trinity.	10 A	7	1 A	56
2	M	Viſ. of the B.V.M. In 15 d. of the H.T.	10	24	2	46
3	Tu	*Dereham*, Norf, *Shrewſbury*.	10	38	3	35
4	W	Tranſl. of S. Mart. B. and C.	10	50	4	21
5	Th	Old Midſummer Day.	11	2	5	7
6	F	*Bungey*, Suff. *Lancaſter*. *Liverpool*.	11	12	5	53
7	S	Tho. à Becket.	11	28	6	43
8	G	Sunday after Trinity.	11	47	7	35
9	M	From the Day of the H.T. in 3 Weeks	Morn.		8	33
10	Tu	*Howden*, Yorkſh. *Wolverhampton* Staff.	0	13	9	35
11	W	Term End.	0	54	10	39
12	Th	*Canterbury*, K. *Peterborough*, North.	1	52	11	42
13	F	*Huntingdon*. *Woburn*, Bedf.	☽ Riſes		Morn.	
14	S	Days decreaſed 26 min.	9 A	23	0	41
15	G	Sunday after Trinity. Swithun, B.	9	39	1	35
16	M	*Wincheſt*. Hampſh. *Woodhurſt*, Dorſet.	9	51	2	24
17	Tu	*Leek*, Staff. *Stevenage*, Hertf.	10	3	3	9
18	W	*Denbigh*, *Exeter*, *Huntingdon*.	10	12	3	51
19	Th	*Kinninghall*, Norfolk.	10	22	4	31
20	F	Marg. V. & M. Antioch.	10	34	5	12
21	S	*Alfreton*, Derby. *Foulneſs*, K. *Swaffh*.	10	46	5	53
22	G	Sund. after Trin. [illegible]	11	3	6	36
23	M	*Daven'ry*, North. *Honiton*, Dev.	11	26	7	22
24	Tu	*Faringhay*, Kent (*Faſt*.	11	58	8	10
25	W	St. James, Ap. & M. *Derby*	Morn.		9	2
26	Th	St. Anne, Mother to Bl. Virg. Mary.	0	47	9	56
27	F	*Headon*. Yorkſh. *Portſdown*, Hants.	1	50	10	52
28	S	Day 15 h. half long. decr. 1 h. 4 m.	☽ Sets		11	46
29	G	6 Sunday after Trinity.	8 A	27	0 A	38
30	M	*Caerlton*, Monm. *Linton*, Cumb.	8	42	1	28
31	Tu	Dog Days begin.	8	55	2	15

M D	☉ Riſes	☉ Sets	♄ Riſes	♃ Riſes	♂ Sets	♀ Sets.	☿ Riſes	Cl. bef ☉
1	3h 45′	8 15	0 M 59	3 M 7	1 M 8	10 A 14	3 M 4	3′ 18″
6	3 48	8 12	0 36	2 45	0 19	9 55	3 1	4 11
11	3 53	8 7	0 12	2 32	0 39	9 32	2 59	4 55
16	3 58	8 2	0 0	2 20	0 59	9 10	2 56	5 29
21	4 4	7 56	11 A 46	2 7	11 9	8 47	2 53	5 50
26	4 11	7 49	11 23	1 54	11 A 31	8 25	2 50	5 57

AUGUST hath xxxi Days.

First Quarter the 4th
Full Moon the 11th
Last Quarter the 19th
New Moon the 27th
Day at
8 at Night.
6 Afternoon.
4 Afternoon.
7 in the Morning.

M D	☉ Decl. North.	
1	17°	54
6	16	34
11	15	7
16	13	54
21	11	56
26	10	13

1	W	Lammas-Day. *Bath*. Som.	9 A	6	3 A	
2	Th	*Yarm*, Y. *Winchester*, Hampſh.	9	19	3	49
3	F	*Carnarvon*, *Daventry*, *Auburn*.	9	33	4	38
4	S	*Epſom*, Surry. *Ravinglaſs*, Cumb.	9	49	5	29
5	G	7 Sunday after Trinity.	10	13	6	25
6	M	Tranſfig. of our Lord.	10	47	7	24
7	Tu	Name of Jeſus.	11	38	8	26
8	W	*Furſut*, Corn. *Ruthin*, Denb.	Morn.		9	39
9	Th	*Llangwiſt*, Denb. *Thirkin*, Middl.	0	47	10	29
10	F	S. Laur. Arch D. of R. & M.	2	10	11	2
11	S	Princeſs AUGUSTA born 1737.	☽ Riſes		Morn.	
12	G	8 Sund. aft. Trin. Pr. of WALES b. 1762.	7 A	59	0	16
13	M	*York*, *Northampton*. *St Eades*, *Stow*.	8	10	1	2
14	Tu	Days are now ſhortened 1 h. 56 m.	8	21	1	46
15	W	*Bakewell*, Derb. *Preſton*, Lanc.	8	31	2	27
16	Th	Prince born. *Aſhborn*, Derb.	8	41	3	9
17	F	*Bardney*, Hampſhire.	8	54	3	51
18	S	Day 14 h. 24 min. long.	9	9	4	3
19	G	9 Sunday after Trinity.	9	29	5	17
20	M	☉ Amplitude N. 16°. 35′.	9	58	6	5
21	Tu	*Heanor*, Derb. *Horncaſtle*, Linc.	10	38	6	56
22	W	☉ in ♍ 6 hours 40 min. app. time.	11	35	7	47
23	Th	*Betford*, Northumb. *Denton*, Ox. *Faſt*	Morn.		8	43
24	F	St. BARTHOLOMEW.	0	46	9	40
25	S	*Llanerchemith*, Angl. *Milver*. Som.	2	8	10	3
26	G	10 Sunday after Trinity.	3	33	11	24
27	M	*Coventry*, Warw. *Ripley*, Yorkſh.	☽ Sets		0 A	1
28	Tu	S Au. B. of Hip. C. D.	7 A	20	1	
29	W	Beheading of John Bapt.	7	31	1	51
30	Th	Days decreaſed near 3 hours	7	45	2	4
31	F	☉ due E. 6 h. 25 m. alt. 12° 20.	8	2	3	31

M D	☉ Riſes		☉ Set		♄ Riſe.		♃ Riſes		♂ Sets		♀ Sets.		☿ Riſes		Cl. bef. ☉	
1	4h	19	7	40	10 A	57	1 M	34.	11 A	9	7 A	46	3 M	37	5′	45″
6	4	27	7	32	10	41	1	22	10	58	7	11	3	0	5	20
11	4	35	7	24	10	24	1	8	10	47	7	0	Sets		4	39
16	4	44	7	15	10	6	0	54	10	36	Riſes		7 A	43	3	44
21	4	53	7	6	9	46	0	40	10	24	4 M	43	7	40	2	37
26	5	2	6	57	9	26	0	26	10	13	4	5	7	32	1	13

SEPTEMBER hath xxx Days.

Firſt Quarter the 3d } Day at { 1 in the Morning.
Full Moon the 10th } Day at { 7 in the Morning.
Laſt Quarter the 18th } Day at { 10 in the Morning.
New Moon the 25th } Day at { 5 in the Afternoon.

M D	⊙ Decl. North.	
1	8°	4′
6	6	51
11	4	19
16	2	24
21	0	27
26	1 S	30

1	S	*Giles* Abbot & Conf. *Northmoore*, Wilts	8A	23	4A	27
2	G	11 Sund. aft. Trin. Lond. Burnt, 1666	8	53	5	26
3	M	*Brecknock*, 6 Days. *Bridgeſtock*, Dev.	9	39	6	27
4	Tu	*Bartholomew*, London. *Monmouth*.	10	43	7	29
5	W	*Chipping Norton*, Ox. *Kilnotton*, Corn.	12	0	8	30
6	Th	*Folkingham*, Linc.	Morn.		9	26
7	F	Dog Days End.	1	25	10	18
8	S	Nativ. of the B. V. M. *Wirkſworth* Der.	2	50	11	5
9	G	12 Sunday after Trinity.	4	10	11	49
10	M	Day 12 h. 56 m. long. ☽ eclip. inviſ.	☽ Riſes		Morn.	
11	Tu	*Tallowdown*, Dorſetſh.	6A	46	0	30
12	W	*Brentford*, Midd. *Whitehaven*, Cumb.	6	55	1	12
13	Th	*Newton*, Lanc. *Tregony*, Cornw.	7	9	1	53
14	F	Holy Croſs Day.	7	22	2	35
15	S	City of *Durham*.	7	41	3	19
16	G	13 Sunday after Trinity.	8	5	4	5
17	M	Lambert, Biſh. &. M.	8	41	4	55
18	Tu	*Maſham*, Yorkſh. *Southwark*, *Stirbtich*, C	9	29	5	46
19	W	Ember Week.	10	34	6	41
20	Th	*Deviſes*, Wilts. *Faſt*	11	50	7	35
21	F	St. MATTHEW, A. & Ev.	Morn.		8	29
22	S	⊙ in ♎ 2h. 57 m. app. time. K. G. III. Cr.	1	12	9	21
23	G	14 Sunday after Trinity.	2	38	10	10
24	M	*Cheſhunt*, Hertf. *Kanymyneck*, Shropſh.	4	5	11	0
25	Tu	*Cheſterfield*, *Rippon*. ⊙ eclipſ. inviſ.	☽ Sets		11	49
26	W	St. Cyprian, Archb. of Carth. & Mar.	6A	0	0 A	39
27	Th	*Clapham*, Yorkſh. *Northall*, Middl.	6	16	1	31
28	F	*Glouceſter*. *Tuxford*, Nott.	6	36	2	28
29	S	St. MICHAEL, and all Angels.	7	3	3	27
30	G	15 Sunday after Trinity.	7	46	4	30

M.D	⊙ Riſes		⊙ Sets		♄ Riſes		♃ Riſes		♂ Sets.		♀ Riſes		☿ Sets		Cl. aft. ⊙	
1	5h	13′	6	46	9 A	05	0 M	7	10A	3	3M	27	7 A	20	0′	29′
6	5	23	6	36	8	56	11A	48	9	0	3	13	7	8	2	5
11	5	33	6	26	8	29	11	37	9	55	2	59	6	57	3	47
16	5	43	6	16	8	12	11	17	9	50	2	45	6	45	5	32
21	5	53	6	6	7	55	11	6	9	45	2	31	6	34	7	16
26	6	3	5	49	7	38	10	56	9	40	2	17	6	22	8	57

OCTOBER hath xxxi Days.

			M D	⊙ Decl. South
			1	3° 27′
First Quarter the 2d		8 in the Morning.	6	5 24
Full Moon the 9th		11 at Night.	11	7 18
Laſt Quarter the 18th	Day at	3 in the Morning.	16	9 10
New Moon the 25th		3 in the Morning.	21	10 50
First Quarter the 31ſt		6 at Night.	26	12 43

1	M	Remig. B. of Rhemes.	8A	44	5 A	33
2	Tu	*Nottingham*, for Cheeſe, Hops, & Cattle	9	58	6	34
3	W	*Penkridge*, Staff.	11	21	7	31
4	Th	Days de. 5h. 12m. D. 11h. 22 m. long.	Morn.		8	24
5	F	*Llanvilling*, Montg. *Lamport*, Som.	0	44	9	12
6	S	Faith, Virgin and Mart. *Hull*, Y.	2	5	9	56
7	G	16 Sunday after Trinity.	3	22	10	38
8	M	*Abingdon*, Berks. *Challock*, K. *Swanſey*.	4	37	11	19
9	Tu	S. Denys, Areop, B.&M. *Lancaſter*.	☽ Riſes		11	59
10	W	Old Michaelmas Day.	5A	26	Morn.	
11	Th	*Banbury*, Oxf. *St. Alban's*, Hert.	5	39	0	41
12	F	*Deviſes*, Wilts. *Caſtor*, Linc. *Coxton*, Cu.	5	55	1	23
13	S	Tranſlat. of K. Ed. Conf.	6	16	2	9
14	G	17 Sunday after Trinity.	6	47	2	58
15	M	*Falſley*, Warwickſh.	7	30	3	48
16	Tu	*Market Boſworth*, Leic. *Hay*, Breckn	8	28	4	39
17	W	Etheldred, Virg.	9	38	5	34
18	Th	St. LUKE Evang.	10	56	6	27
19	F	*Market-Harbor*, Leic *Yarm*. Yorkſh.	Morn.		7	17
20	S	*Aſhborne*, Derb. *Colcheſter*, *Hereford*.	0	19	8	6
21	G	18 Sunday after Trinity.	1	42	8	54
22	M	⊙ in ♏ 10 ho. 36 min. app. time.	3	6	9	42
23	Tu	*Ripley*, Derb. *Saff. Walden*, Eſſ. *Stockport*,	4	32	10	31
24	W	*Tamwrrth*, Staff. *Windſor*, Berks.	6	3	11	23
25	Th	K. GEORGE III. Acc. Criſpin.	☽ Sets		0A	18
26	F	K. GEORGE III. Proc. *Chepſtow*, M.	5A	8	1	17
27	S	*Buckingham*, *Warwick*, *Aſſing*. *Faſt*	5	44	2	20
28	G	19 Sun. aft. Trin. St. SIM. & JUDE.	6	37	3	26
29	M	*Newcaſtle upon Tyne*, *Burton upon Trent*.	7	48	4	30
30	Tu	*Banbury*, Ox. *Ely*, Camb. *Maidenhead*,	9	11	5	30
31	W	*Brignorth*, Shr. *Devizes*, *Settle* *Faſt*.	10	36	6	25

M D	⊙ Riſes	⊙ Sets	♄ Riſes	♃ Riſes	♂ Sets	♀ Riſes	☿ Sets	Cl. aft. ⊙
1	6h 12′	5h 47	7 A 15	10 A 38	9 A 38	2 M 14	6 A 2	10 34′
6	6 22	5 37	6 56	10 22	9 37	2 18	5 41	12 5
11	6 31	5 28	6 38	10 6	9 37	2 22	5 30	13 23
16	6 41	5 18	6 19	9 50	9 37	2 29	Riſes	14 30
21	6 51	5 8	6 1	9 34	9 37	2 31	5 M 59	15 22
26	7 0	4 59	5 43	9 18	9 38	2 35	5 19	15 57

NOVEMBER hath xxx Days.

Full Moon the 8th	Day at	5 in the Evening.
Last Quarter the 16th		7 At Night.
New Moon the 23d		1 Afternoon
First Quarter the 30th		8 in the Morning.

M. D.	☉ Dec. South.	
1	14°	42′
6	16	14
11	17	40
16	18	58
21	20	7
26	21	8

1	Th	All Saints Day.	11 A	59	7 A	13
2	F	All Souls.	Morn.		7	59
3	S	On the Morrow of all Souls.	1	17	8	42
4	G	20 Sunday after Trinity.	2	30	9	22
5	M	Papiſts Conſpiracy.	3	42	10	2
6	Tu	Term begins.	4	54	10	44
7	W	Prince Henry Fred. born, 1745.	6	6	11	25
8	Th	*Cirenceſter*, *Colcheſter*, *Hertford*, *Kendall.*	☽ Riſes		Morn.	
9	F	*Darlington*, Durham. *Stamford*, Linc.	4 A	23	0	10
10	S	*Rocheſter*, Kent. *Ruthin*, Denb.	4	51	0	55
11	G	21 Sund. aft. Trin. S. Martin, B.&C.	5	30	1	45
12	M	On the Morrow of St. Martin.	6	22	2	36
13	Tu	Britius, Biſhop.	7	27	3	28
14	W	*Brecknock*, and five following Days.	8	42	4	21
15	Th	Machutus, Biſhop.	10	0	5	12
16	F	*Andover*, Hamp. *Caerfilley*, Glan.	11	19	5	59
17	S	Hugh, Bp. of Linc. *Launceſton*,	Morn		6	46
18	G	22 Sunday after Trinity.	0	39	7	30
19	M	In eight Days of Saint Martin.	2	1	8	17
20	Tu	Edmund, King and Mart.	3	27	9	5
21	W	☉ in ♐ 6 hours 30 min. app. time	4	56	9	56
22	Th	Cecilia, V. & M. Old Martinmas.	6	31	10	53
23	F	St. Clem. I. Bp. of R. & M.	☽ Sets		11	54
24	S	Days are now decreaſed 8 ho. 12 m.	4 A	17	1 A	0
25	G	23 Sund. aft. Tr. Pr. W. Hen. b. 1743.	5	22	2	8
26	M	In 15 Days of St. Martin.	6	43	3	12
27	Tu	*Littlebury*, Eſſex.	8	11	4	11
28	W	Term Ends. *Glouceſter*, *Lincoln.*	9	36	5	3
29	Th	Day-light begins 50 min. after 5.	10	57	5	51
30	F	St. And. A.&M. P's Dow. W. b. 1719.	Morn.		6	35

M D	☉ Riſes		☉ Sets		♄ Riſe		♃ Riſes		♂ Sets.		♀ Riſes		☿ Riſes		Cl. aft. ☉	
1	7h	11	4h	48	5 A	1[illegible]	8 A	52	9 A	39	2 M	45	5 M	18	16′	14″
6	7	20	4	39	4	50	8	31	9	41	3	54	5	40	16	6
11	7	29	4	30	4	25	8	10	9	42	3	3	6	3	15	38
16	7	38	4	22	Sets		7	50	9	42	3	13	6	26	14	48
21	7	45	4	15	6 M	42	7	30	9	43	3	22	6	49	13	38
26	7	51	4	9	6	15	7	10	9	44	3	32	7	12	12	7

DECEMBER hath xxxi Days:

M D	⊙ Decl. South.
1	21° 58′
6	22 38
11	23 6
16	23 24
21	23 29
26	23 23

Full Moon the 8th	Day at	Noon.
Laſt Quar. the 16th		8 in the Morning.
New Moon the 22d		11 at Night.
Firſt Quar. the 30th		2 in tne Morning.

1	S	*Rotherham,* Yorkſh.	0 M 1	7 A 15
2	G	Advent Sunday.	1 27	7 54
3	M	*Darlington,* Durham.	2 3[illegible]	8 35
4	Tu	*Atherſtone,* Warw. *Bangor, Thurſk,* Y.	3 49	9 16
5	W	*Colford,* Glouceſterſhire.	5 2	9 59
6	Th	Nichol. Biſh. of Myra in Lycia.	6 14	10 45
7	F	Day 7 hours 56 min. long.	7 27	11 35
8	S	Concept. of the B. V. M.	☽ Riſes	Morn.
9	G	2 Sunday in Advent.	4 A 8	0 24
10	M	*Kimbolton,* Hunt. *Newport,* Shrop.	5 9	1 16
11	Tu	*Bewdley,* Wor. *Preſton,* Lan *Roch,* K.	6 22	2 7
12	W	*Bedal,* Yorkſh. *Chorlley,* Dev. *Shrewſb.*	7 37	2 59
13	Th	Lucy, Virg. & Mart.	8 56	3 46
14	F	Days dec. 8 h. & above 3 qrs.	10 14	4 32
15	S	*Atherſtone,* Warw. *Namptwich,* Cheſh.	11 32	5 16
16	G	3 Sunday in Advent.	Morn	6 0
17	M	*Exeter,* Devonſh. *Grantham,* Linc.	0 5[illegible]	6 45
18	Tu	*Spalding,* Linc.	2 1[illegible]	7 33
19	W	Ember Week.	3 4[illegible]	8 21
20	Th	⊙ in ♑ 18 h. 35 min. app. ti. *(Faſt.*	5 1[illegible]	9 21
21	F	St. THOMAS Ap. & M.	6 51	10 23
22	S	*Newport-Keams,* Montgom.	☽ Set	11 29
23	G	4 Sunday in Advent.	3 A 5[illegible]	0 A 36
24	M	Durat. of Twil. 2 h. 11 m. *(Faſt*	5 24	1 40
25	Tu	CHRISTMAS-DAY.	6 55	3 37
26	W	St. Stephen, 1ſt Martyr	8 2[illegible]	3 28
27	Th	St. John, Ap. & Evaug.	9 4[illegible]	4 14
28	F	Innocents Day.	10 57	4 58
29	S	*Cockhill,* Som.	Morn	5 39
30	G	Sunday after Chriſtmas-Day.	0 10	6 19
31	M	Silveſt. *(Farewel Gents for this Year)*	1 21	9 59

M D	☽ Riſes	⊙ Sets	♄ Sets	♂ Riſe	♃ Sets	♀ Rises	☿ Riſe	Cl. aft. ⊙
1	7h 57′	4h 3′	5 M 47	6 A 42	9 A 45	3 M 46	7 M 14	10′ 19′
6	8 2	3 58	5 2[illegible]	6 20	9 45	3 57	7 0	8 15
11	8 5	3 55	5 2	5 54	9 44	4 8	Sets	5 59
16	8 7	3 53	4 40	5 30	9 44	4 18	3 55	3 34
21	8 8	3 52	4 17	5 6	9 43	4 29	4 9	1 4
26	8 7	3 53	3 55	4 42	9 43	4 40	4 29	1 bef. 26

A TABLE of all the KINGS and QUEENS of *England*, ſince the Conqueſt.

The Year of the Birth of each King and Queen; alſo the Year, Month, and Day, whereon they began to reign: beginning the Year the firſt Day of January, 1763.					The Length of each Reign.			The Years expired ſince each Reign ended.
Names.	Born	Began to Reign.			Y.	M.	D.	ſince
William Conq	1027	1066	October	14	20	10	26	677
William Rufus	1057	1087	Septem.	9	12	10	24	664
Henry I.	1068	1100	Auguſt	2	35	4	0	629
Stephen	1105	1135	Decem.	1	18	10	24	610
Henry II.	1132	1154	October	25	34	8	11	575
Richard I.	1156	1189	July	6	9	9	0	565
John	1166	1199	April	6	17	6	13	548
Henry III.	1207	1216	October	19	56	1	0	492
Edward I.	1239	1272	Novem.	16	34	7	21	457
Edward II.	1284	1307	July	7	19	6	13	437
Edward III.	1312	1327	January	20	50	5	1	387
Richard II.	1366	1377	June	21	22	3	8	365
Henry IV.	1367	1399	Septem.	29	13	5	21	351
Henry V.	1389	1413	March	20	9	5	11	342
Henry VI.	1421	1422	Auguſt	31	38	6	4	303
Edward IV.	1442	1461	March	4	22	1	5	281
Edward V.	1471	1483	April	9	0	2	13	281
Richard III.	1443	1483	June	22	2	2	0	279
Henry VII.	1457	1485	Auguſt	22	23	8	0	255
Henry VIII.	1492	1509	April	22	37	9	6	217
Edward VI.	1537	1547	January	28	6	5	8	211
Mary I.	1516	1553	July	6	5	4	11	206
Elizabeth	1533	1558	Novem.	17	44	4	7	161
James I.	1566	1603	March	24	22	0	3	139
Charles I.	1600	1625	March	27	23	10	3	115
Charles II.	1630	1649	January	30	36	0	7	79
James II.	1633	1685	February	6	4	0	7	75
William III.	1650	1689	Feb.	13	5	10	15	6
Mary II.	1662				13	0	22	61
Anne	1665	1702	March	8	12	4	24	50
George I.	1660	1714	Auguſt	1	12	10	10	37
George II.	1683	1727	June	11	33	4	3	4
George III.	1738	1760	October	25	whom God preſerve			

A Compendious TABLE of INTEREST,

Shewing the Intereſt of any Sum of Money, from a Million to a Pound; for any Number of Days, at any Rate of Intereſt.

Nº.	l.	s.	d.	q.		Nº.	l.	s.	d.	q	,
1000000—	2739	14	6	0	,99	1000—	2	14	9	2	,14
900000—	2465	15	0	3	,29	900—	2	9	3	3	,12
800000—	2191	15	7	1	,59	800—	2	3	10	0	,11
700000—	1917	16	1	3	,89	700—	1	18	4	1	,10
600000—	1643	16	8	2	,19	600—	1	12	10	2	,80
500000—	1369	17	3	0	,49	500—	1	7	5	3	,70
400000—	1095	17	9	2	,79	400—	1	1	11	0	,50
300000—	821	18	4	1	,09	300—	0	16	5	1	40
200000—	547	18	10	3	,40	200—	0	10	11	2	,30
100000—	273	19	5	1	,70	100—	0	5	5	3	,01
90000—	246	11	6	0	,32	90—	0	4	11	0	,71
80000—	219	3	6	0	,96	80—	0	4	4	2	,41
70000—	191	15	7	1	,59	70—	0	3	10	0	,11
60000—	164	7	8	0	,22	60—	0	3	3	1	,81
50000—	136	19	8	2	,85	50—	0	2	8	3	,51
40000—	109	11	9	1	,48	40—	0	2	2	1	,21
30000—	84	3	10	0	,11	30—	0	1	7	0	,90
20000—	54	15	10	2	,74	20—	0	1	1	0	,60
10000—	27	7	11	1	,37	10—	0	0	6	2	,30
9000—	24	13	1	3	,23	9—	0	0	5	3	,67
8000—	21	18	4	1	,10	8—	0	0	5	1	,04
7000—	19	3	6	2	,96	7—	0	0	4	2	,41
6000—	16	8	9	0	,82	6—	0	0	3	3	,78
5000—	13	13	11	2	,58	5—	0	0	3	1	,15
4000—	10	19	2	0	,55	4—	0	0	2	2	,52
3000—	8	4	4	2	,41	3—	0	0	1	3	,89
2000—	5	9	7	0	,27	2—	0	0	1	1	,26
1000—	2	14	9	2	,14	1—	0	0	0	2	,63

RULE.

Multiply the Sum by the Number of Days; and that Product by the Rate per Cent. Then cut off the two laſt Figures to the Right Hand, and the reſt you muſt find in the Table.

Example, What is the Intereſt of 100 l. for 365 Days at 5 per Cent.

Nº. of Days 365
multiply by 100
Product 36500
multiply by 5 Rate p. Cent.
1825|00

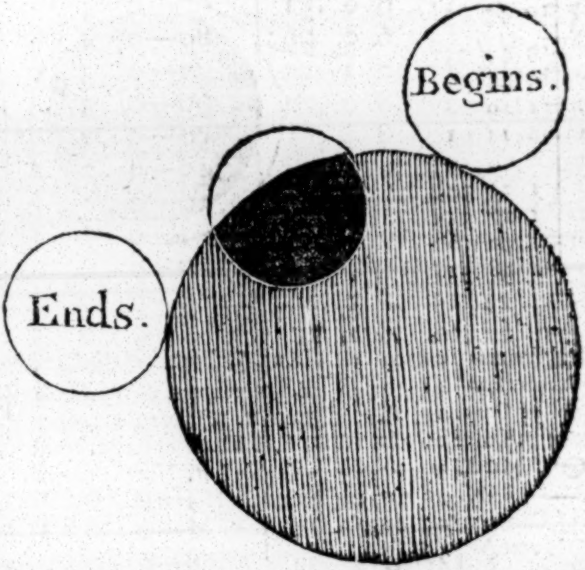
Then in the Table
againſt 1000 is 2 14 9 2 ,14
800 2 3 10 0 ,11
20 0 1 1 0 ,60
5 0 0 3 1 ,15
Anſw. 5 0 00 ,00

Of the ECLIPSES of the LUMINARIES, which will happen in this Year 1764. By Mr. JOHN METCALFE.

In this Year 1764, there are Four Eclipſes of the Luminaries expected; Two of the Sun, and Two of the Moon: they will happen in the following Order of Time.

The firſt is a partial and viſible Eclipſe of the Moon; it will happen, Part of it on *Saturday*, and Part on *Sunday*, the 17th and 18th Days of *March*; according to the Calculation and Type here given:

App. Time, at	London.	York.	Wentwor.	Richmond	Edinburgh
	H. m. ſ.	H. m. ſ.	H. m. ſ.	H. m. ſ.	H m. ſ.
Beginning	10 49 39	10 45 39	10 44 09	10 42 51	10 37 39
Ecliptic Oppoſ.	12 06 21	12 02 21	12 00 51	11 59 33	11 54 21
Middle	12 12 49	12 08 49	12 07 19	12 06 01	12 00 49
Eud	1 36 00	1 32 00	1 30 30	1 29 12	1 24 00
Duration	2 46 21	Dig. Eclip.	8° 30′ 41	lat. ☽ n. d.	= 38′ 31
Horiz. Parall. ☽	= 60′ 59	Semidi. ☽	= 16 42	h.m. ☽ à ☉	= 34 55



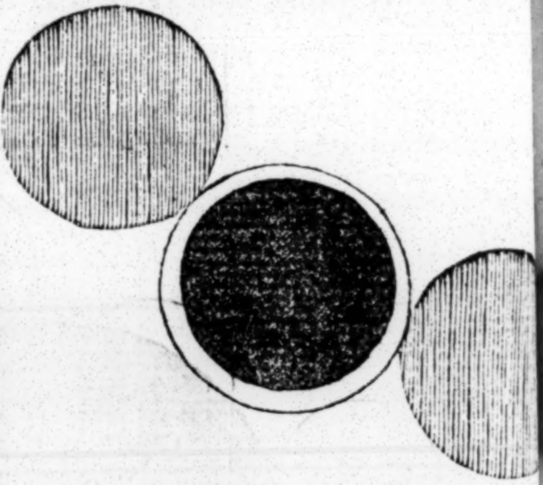
The Moon will be vertical, at rhe Beginning of this Eclipſe, to the North Part of the Kingdom of *Congo*, in *Africa*; at the Middle, to the *Ethiopic* Ocean, Eaſt of the Iſland of *St. Mattheo*; and, at the End of the Eclipſe, vertical to the ſame Ocean, about the Middle of the Line connecting *Siera Leona*, in *Guinea*, and *Olinda*, in *Braſil*: The Eclipſe therefore will be viſible, at the Beginning, to all the *Ruſſian* Dominions in *Aſia*, *Tartary*, *India* on both Sides of the River *Ganges*, and to the Iſland of *Sumatra* in the *Indian* Ocean: at the End, viſible to all *South-America*, and that Part of *North-America*, Eaſt of the River *Miſſiſſipi*. It will be viſible, from the Beginning to the End, to all Parts of *Europe* and *Africa*, *Arabia*, *Perſia*, leſſer *Aſia*, *Georgia*, the *Caſpian* Sea, and the Weſtern Parts of *Siberia*; the *Indian*, *Southern*, *Ethiopic* and *Atlantic* Oceans; *Braſil*, *Laplata*, *Paragua*, *Amazonia*, *Terra-Firma*, the *Antilles*; Eaſtern Parts of

North-America, *Hudſon's* and *Baffin's* Bays, *Greenland*, *Groenland*, and Parts near the Pole.

The ſecond is a viſible *annular* Eclipſe of the Sun, on *Sunday*, the firſt Day of *April*, in the Morning; it will be *central* in many Parts of *England*, but no where *total:* the Diameter of the Sun will exceed that of the Moon; conſequently, at the Middle of the Eclipſe, there will appear an *Annulus*, or very bright Ring, encompaſſing the Moon. This will be a very formidable Eclipſe, for there will be avove $\frac{8}{10}$ of the Sun's Light diminiſhed; but whether the Darkneſs, under the Center of the Moon's Shadow, will be ſo great as to cauſe any Star of the firſt Magnitude to appear, cannot now be determined.

It is preſumed, the following Numbers, correctly computed from new Tables, will nearly agree with good Obſervations:

1 *Ap.* 1764. A.M.	LONDON.		
Apparent Time	H.	m.	ſ.
Eclipſe begins	9	15	10
Central Ingreſſion	9	56	14
Total Immerſion	10	38	59
Neareſt Approx. of Cent.	10	43	05
Middle of the Ecl.	10	44	35
Time of Emerſion	10	45	49
Central Egreſſion	11	49	28
The Eclipſe ends	12	14	01
Time of tot. Imm.	0	06	50
Central Duration	1	33	34
Time of Incidence	1	27	55
Time of Repletion	1	30	56
Duration of Ecl.	2	58	51



	°	′	″
Dig. Ecl. at central Ingreſs	05	01	54
D°. at the total Immerſion	11	01	48
D°. at neareſt App. of Cent.	11	18	07
Annulus und. the cent. Shade	00	01	18
Greateſt Limb of ⊙'s Light S.	00	01	52
Leſſer Ditto —— N.	00	00	44
Neareſt Diſtance of Centers	00	00	34
Firſt Cont. from ⊙'s vert. W.	99	29	40
Laſt Contact Ditto —— E.	45	15	31
Hourly Mot. of the ☽ à ⊙	00	27	16
Defect of the Sun's Light	$\frac{84488}{100000}$		
Quantity of the Sun's Light	$\frac{15512}{100000}$		

	°	′
Long. ⊙ ☽ at the Orb. Conj. V.	12	10
Ecliptic Long. of the Moon V.	12	08
Longit. of Moon's Apogee V.	24	45
D°. of Moon's aſcend. Node V.	04	45
Moon's Lat. North, aſcend.	00	40
Moon's Horizontal Parallax	00	53
Angle of Moon's viſible Way	05	42
Semidiameter of the Sun	00	16
Semidiameter of the Moon	00	14
Meridian Angle at ☊	23	30
Sun's North Declination	04	49
M. Time of the Orbit ☊	10h	30

Calculation of this Eclipſe, to every Five Min. of its Duration, at *London*.

App. Time.		Digits Eclipſed.			True Alt. of Sun.			Azim. fr. Eaſt.			Dir. ☽'s Center.			Alt. ⊙ und. C. Sh.		
H.	M.	°	′	″	°	′	″	°	′	″	°	′	″	°	′	″
IX.	15	00	00	00	32	07	45	39	07	10	80	31	36	19	32	32
	20	00	39	38	32	43	38	40	24	51	79	55	11	23	27	35
	25	01	20	16	33	19	03	41	43	35	79	18	51	26	39	40
	30	02	00	54	33	53	16	43	03	06	78	27	39	29	22	49

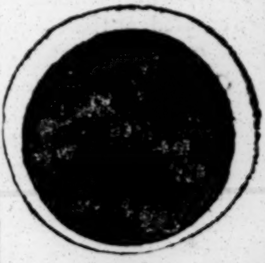
App.

App. Time.		Digits Eclipſed.			True Alt. of Sun.			Azim. fr. Eaſt.			Dir. Moon's Center.			Alt. Sun und. C. Sh.		
H.	M.	°	′	″	°	′	″	°	′	″	°	′	″	°	′	″
IX.	35	2	41	16	34	7	0	44	23	44	78	3	2	31	43	39
	40	3	21	31	34	59	58	45	45	21	77	25	16	33	45	7
	45	4	1	32	35	32	6	47	7	58	76	46	47	35	30	16
	50	4	41	28	39	3	30	48	31	36	76	9	13	37	0	30
	55	5	21	9	36	33	52	49	56	19	75	31	21	38	16	57
X.	—	6	0	45	37	3	38	51	22	7	74	56	17	39	19	56
	5	6	40	22	37	32	4	52	48	48	74	22	35	40	10	0
	10	7	19	16	37	59	24	54	16	45	73	45	16	40	49	15
	15	7	58	17	38	26	56	55	45	32	73	21	11	41	12	16
	20	8	37	8	38	52	19	57	15	16	73	4	35	41	24	54
	25	9	16	5	39	17	3	58	46	8	73	29	8	41	25	3
	30	9	54	38	39	40	48	60	18	0	74	32	15	41	12	35
	35	10	32	45	40	3	20	61	50	49	78	13	41	40	47	37
	40	11	9	15	40	24	8	63	24	43	87	24	48	40	10	26
X.	43′ 5″	11	18	7	40	37	24	64	23	2	Eaſt.			39	41	2
	45	11	7	46	40	45	0	64	59	17	145	10	4	39	20	34
	50	10	31	36	41	4	8	66	34	53	127	27	28	38	17	37
	55	9	53	42	41	22	6	68	11	20	123	58	0	37	1	25
XI.	—	9	15	36	41	38	47	69	48	36	122	58	11	35	31	16
	5	8	37	57	41	56	16	71	26	39	122	58	30	33	46	10
	10	8	0	9	42	8	29	73	5	24	123	18	13	31	44	40
	15	7	22	19	42	21	28	74	44	51	123	52	29	28	24	20
	20	6	44	39	42	33	2	76	24	55	124	33	28	26	41	25
	25	6	6	56	42	43	22	78	5	33	125	21	4	23	29	17
	30	5	29	20	42	52	19	79	46	39	126	11	48	19	35	12
	35	4	51	47	42	59	54	81	38	13	127	5	18	14	27	27
	40	4	14	21	43	6	5	83	10	8	128	0	18	5	21	20
	45	3	36	43	43	11	24	84	52	21	128	58	42			
	50	2	58	55	43	14	55	86	34	51	129	54	32	The center of the ☽'s Shadow in the Expanſum.		
	55	2	22	0	43	16	20	88	17	21	130	55	7			
XII.	—	1	44	37	43	18	49	90	0	0	131	54	59			
	5	1	7	15	43	16	20	1	42	39	132	55	1			
	10	0	29	46	43	14	55	3	25	9	133	55	59			
	15	0	0	0	43	11	24	5	7	39	134	56	22			

The Time and Quantity of this Eclipse, by Geometrical Conſtruction.

For	Wentwor.		Richmd.		Edinburg.	
	h	m	h	m	h	m
Beginning	9	12	9	12½	9	9½
Greateſt Obſcurity	10	38½	10	39	10	34
End	12	9	12	8	12	2
Time of Incidence	1	26½	1	26½	1	24½
Time of Repletion	1	30½	1	29	1	28
Duration	2	57	2	55½	2	52½
Ang. 1'ſ Contact from a min. ☉'s Vertex	102½ W.		103½ W		105½ W.	
Dº. laſt Cont. à ☉'s Vertex	49½ E.		50¾ E		55 E.	

Type of the Middle for *Wentworth.*



Annular.

The above Type will alſo nearly agree with the Appearance at *Richmond.*

This will be an *annular* ECLIPSE in moſt Parts of *England*; and, if Clouds interpoſe not, it will give to the Curious an Opportunity of determining eaſily and correctly the Longitudes of many Places in the Kingdom, not yet truly ſettled by Obſervation. JOHN METCALFE.

A Table of the general *Phænomena* of this viſible *Solar* Eclipſe.

1 *April* 1764, in the Forenoon	App.Tim. at *London*.			Latitude South.				Longitude Weſt.			
Semidiameter of the Earth's Diſk = 53′45″											
Semidiam. of the Lunar Penumbræ=30 53	H.	m.	ſ.	°	′	″		°	′	″	
The *Eclipſe* begins as the Sun riſes	7	38	46	0	17	28		24	40	9	
The Sun riſes centrally eclipſed	9	4	17	19	46	4	N	47	48	19	
Center in the *Atlant.* Ocean, a little W. of *Oporto*	10	10	0	41	13	37		9	31	44	
Cent. in *Gallicia* in *Spain*, E. of *Compoſtella*	10	15	0	42	50	38		8	19	18	
Center in the Bay of *Biſcay*	10	20	0	44	26	11		7	3	11	
Sun centrally eclips'd, at middle of its Tranſ.	10	22	31	45	17	39		6	25	4	
Center in *Bretagne*, on the W. Coaſt of *France*	10	30	0	47	49	37		4	28	59	
Ditto, in 90th Degree, near *Breſt* in *France*	10	31	20	48	16	3		4	5	30	
Center in *Engliſh* Channel, W. of *Guernſey*	10	35	0	49	30	47		3	6	6	
Center N. of *Saliſbury* in *Wiltſhire*	10	40	0	51	16	21		1	37	58	
D°. N. of *Higham-Ferrers*, *Northamptonſhire*	10	43	5	52	22	41		0	39	54	
D°. W. of *Boſton*, *Lincolnſhire*	10	45	0	53	4	17		0	2	30	
Centrally eclipſed in the Meridian of *London*	10	45	8	53	7	4					E
Center in the *German* Ocean	10	50	0	54	55	35		1	41	1	
D°. in N. Ocean, W. from *Starenger* in *Norway*	11	0	0	58	48	52		5	52	58	
D°. in *Norway*, between *Bergen* and *Criſtiana*	11	5	0	60	54	22		8	24	51	
D°. in *Norway*, between *Saltſberg* and *Drenth*.	11	10	0	63	4	7		11	21	15	
Sun centrally eclipſed in the Meridian	11	11	6	63	33	39		12	13	37	
Cent. W. of *Define-Hills*, near the *Artic* Circle	11	15	0	66	21	19		15	25	41	
D°. in *Lula Lapmerk*, in *Swediſh Lapland*	11	20	0	67	45	31		20	2	50	
The Penumbra neareſt the North Pole	11	39	53	77	38	57		86	18	50	
The Sun ſets centrally eclipſed	11	40	47	76	54	21		115	13	41	
The Eclipſe ends, as the Sun ſets	1	6	17	56	50	13		80	50	47	
Ingreſſion of the *Auſteralian* Limit	8	26	6	18	34	28	S	34	54	4	W
Middle of the Limit of the Eclipſe	10	22	31	13	37	26	N	17	24	27	E
Limit in the Meridian	11	11	6	25	4	38		12	13	37	
Egreſſion from the South Limit of the Eclipſe	12	18	56	38	38	6		90	52	6	
☽'s lower Limb, in contact with ☉'s Vertex	Dig. Ellip.			25	4	38		12	13	37	
☉ in the S. Interſect. of the Merid. and Horiz.	8°	36	12	35	10	46		77	46	23	W
Sun's lower Limb eclipſed, at the N. Pole, in the univerſal Meridian	8	40	27	90	0	0		12	13	37	E
D°. eclipſed, at the N. Pole of the Moon's Path	6	29	4	60	54	43		74	13	32	W
D°. eclipſed, at the N. Pole of the Ecliptic	6	34	14	66	31	0		79	1	34	

The central Shade enters the Globe in the *Atlantic Ocean*, Eaſt of the *Caribbee Iſlands*, and from thence takes a North-eaſterly Courſe, leaving the *Cape Verd Iſlands* and the *Canaries* to the Eaſt, and the *Azores* to the North-weſt, and arrives in *Spain* 12 min. paſt 10, and again leaves it at 18 minutes; then paſſes over the *Bay of Biſcay*, and into *France* at 30 minutes, and leaves that Kingdom at 33 minutes; and from thence it croſſes the *Britiſh Channel* W. from the Iſlands of *Jerſey*, *Guernſey*, *Alderney* and *Wight*; and enters *England*, between *Weymouth* and *Corf-Caſtle*, in *Dorſetſhire*, at 38 min. paſt 10, app. Time, in Lat. 50° 34′ N.

and Long. 2° 13′ W. from *London:* from this Place it continues its Journey, in a N. N. Eaſterly direction, through this County, *Wiltſhire, Berkſhire, Oxfordſhire, Northamptonſhire, Rutlandſhire,* and *Lincolnſhire,* leaving *England* 46 min. after 10, in Lat. 53° 20′, and Long. 0° 14′ E. from *London.* It then makes a N. N. E. Traverſe, over the *German Ocean,* and arrives at the Weſt Coaſt of *Norway,* in the S. W. Part of the Province of *Bergen*; from thence it purſues its direction through *Norway,* leaving *Saltſberg* and *Criſtiana* to the E. and *Bergen* and *Drontbem* to the W. through the *Swediſh* and *Norwegian Laplands,* and riſes from the Globe in the *Icy Sea,* beyond *Nova Zembla.*

The Center of the Shadow, in its Paſſage over *England,* leaves, a little to the Eaſt, *Saliſbury, Wilton, Andover, Abington, Oxford, Buckingham, Newport-Pagnel, Bedford, Higham-Ferrers, Huntington, Peterborough,* and *Boſton*; and to the Weſt, it leaves *Dorcheſter, Shaftſbury, Devizes, Marlborough, Woodſtock, Banbury, Daventry, Northampton, Rockingham, Stamford,* and *Grantham.*

This Eclipſe will be viſible over all *Europe,* the *Atlantic Ocean,* and the *Mediterranean Sea*; *Barbary, Biledulgerid, Zaara, Negroland, Upper-Guinea,* North Part of *Ethiopia, Nubia, Ægypt* in *Africa*; North Part of *Arabia, Paleſtine, Leſſer Aſia,* N. Part of *Perſia,* the *Hyrcanian Lake,* W. Part of *Siberia* in *Aſia,* and in the N. E. Parts of *North America*; and to many Places within the *Artic Circle.*

The central Shade continues 8 min. in *England*; its true Motion, in this Time, is 3° 9′=219 Miles; being at the Rate of $27\frac{3}{4}$ Miles *per* Minute.

Difference of Lat. 2° 46′. Diff. of Long. 2° 27′.

The Center diſtant from *London* at neareſt Approach $65\frac{1}{4}$ Miles.

The third is a *Lunar Eclipſe,* on *Monday* the 10th Day of *September* in the Morning; the Moon will ſet, in *Great-Britain* and *Ireland,* ſoon after the Beginning of this Eclipſe; for that reaſon, it is unneceſſary to give a Type of it. I ſhall therefore only obſerve, that, in reſpect of the Horizon of *London,* the Moon enters the ⊖'s Shadow, about 25° to the E. of its vertical Diameter, and leaves it 15° above the Horizontal.

10 *Septemb.* A. M.	LONDON.				ſ	°	′	″
	Ap. Time.			Longitude of Moon's Apogee	8	6	57	25
	h.	m.	ſ.	D°. Moon's aſcending Node	♓	25	45	36
Beginning	5	55	54	Moon's ecliptic Longitude	♓	17	59	7
Ecliptic Oppoſition	7	1	12	—— true Lat. at Oppoſition	S. D.		42	53
Middle of the Eclipſe	7	10	16	—— Horizontal Parallax		0	55	46
End	8	24	38	—— Hourly Motion à ⊙		0	29	11
Duration	2	28	44	—— Semidiameter		0	15	17
Digits eclipſed	5°	11	19	Eccentricity of Moon's Orbit				49995

The Moon will be vertical, at the Beginning, Middle, and End, to the *Pacific Ocean*: the Eclipſe, therefore, will be viſible in *Great-Britain, Ireland, Spain, Portugal,* and the Weſtern Coaſt of *Africa,* at the Beginning; and, from the Beginning to the End, in all Parts both of *N.* and *S. America,* the *Pacific Ocean,* the W. Parts of the *Atlantic* and *Ethiopic Oceans.*——This Eclipſe will not be ſeen in *Aſia,* as it will end before the Moon riſes to the moſt Eaſtern Parts.

The fourth Eclipſe will be of the Sun, and happen on *Tueſday* the 25th Day of *September,* about 5 o'Clock in the Afternoon; but inviſible *here,* and to all Parts of *Eurrpe*, *Aſia*, *Africa* and *N. America*. It will be a partial Eclipſe in the South Parts of *S. America* ; as appears from the following Table of the *Borealion*, or North Limit, as it paſſes over the Globe.

Ap. T. at	*London.*			Long. W.			Lat. N.		
Afternoon	h.	m.	ſ.	°	′	″	°	′	″
Ingreſſion	3	10	17	137	5	11	21	52	52
Middle	4	54	47	77	13	11	7	31	11S
Egreſſion	5	1	39	8	56	7	36	16	43

	°	′	″
Long. ☉ ♎	3	2	7
Lat. Moon S. A.		40	6
Semidiameter ☉		16	3
Moon's Ho. Mot. à ☉		34	14

Wentworth, *April* 25, 1763. JOHN METCALFE.

Mr. *Thomas Harris*, of *Brington*, calculated all the Eclipſes with very great Accuracy ; but particularly the famous *ſolar* one for every Degree of Latitude and Longitude, from the Beginning to the End : but hope he will generouſly excuſe the not publiſhing his Labour this Year, on account of the Want of Room. But *He*, and Mr. *Steven Hodges*, of *Althorp*, near *Northampton*, who very correctly calculated the *lunar* Eclipſe, and the great *ſolar* one, for *Copenhagen*, *Liſbon* and *Berlin*, Mr. *Tho. Hopkinſon* of *Coldwell* ; all for the Meridian of *London* ; Mr. *Will. Kingſton* of *Bath*, the great *ſolar* one for *Greenwich* ; Mr. *Tho. Quanbrough*, Teacher of the Mathematicks at *Grantham*, for that Meridian, by *Ferguſon's* and *Leadbetter's* Tables ; Mr. *Joſeph Webſter*, for *Loughbrough*, and Mr. *T. Wilkinſon* of *North Luffenham* in *Rutland* ; are, each of them, deſired to excuſe the Editor, on the Account aforeſaid ; and accept of his ſincere Thanks for paſt Favours, as well as an Aſſurance, that their further Labours ſhall meet with Regard.

A Letter to the Author, from Mr. *Cha. Wildbore*, in Anſwer to Mr. *Sam. Bamfield's*, in laſt Year's Diary.

SIR,

I have herewith returned you Mr. *Bamfield's* Letter, but muſt beg to be excuſed from attempting the Verſes he deſires ; for, though no Perſon ſhould be more ready to beſtow Praiſes upon the laudable Attempts of the ingenious than myſelf, yet I am far from being able to do it in this Caſe : When a Man, without having given one Demonſtration or Reaſon for what he ſays, ſhould take it into his Head to imagine that he has overthrown a Syſtem, eſtabliſhed by the greateſt of Mathematicians, and *confirmed*, inſtead of being *overthrown*, by Experiments made in every known Part of the Globe.——if ſeveral late Publiſhers had taken into Conſideration a Sentiment of an ingenious Author, that whenever we find any thing in the Writings of a great Man, which we imagine is contrary to Reaſon and Truth, we ought not to think ourſelves competent Judges in the Caſe, but to paſs on, and impute the ſeeming Obſcurity or Contradiction to our Want of Penetration ; and that, if ſuch great Men as a PLATO, a TULLY, a BOYLE, or a NEWTON, were alive again, and to hear our Objections, they would ſoon make us aſhamed of our own Weakneſs !——I ſay, if theſe Gentlemen had taken this duely into Conſideration, it might have taught them more Modeſty in offering their Objections to the World, and eſpecially *this Author*, in the Letter I return you ; wherein (without attempting to demonſtrate) he ſays, "That the immenſe Diſtance of the "fixed Stars is no reaſon why the ſame Star ſhould be in the Zenith at "one Time of the Year, that is there at another ;" and then breaks out upon this with Exultance: "How now muſt every Aſtronomer ſtand "amazed at the Folly, Stupidity, and Abſurdity, of all preceding Aſtro-"nomers; if not at their own!" Is not this very fine? Muſt then Experiment, Reaſon, and Truth, ſubmit to Arrogance, Falſhood and Affirmation?——He afterwards lets you know, that, if I will humbly beg it of him, he will be graciouſly pleaſed to condeſcend to ſend you an *Hypotheſis*, to ſhew how the Earth *may* move in the Equinoctial, and yet Days and Nights exhibit themſelves even as now: Which is to be done by proving that nobody knows the Nature of Refraction, that it will turn a Ray falling in a direct Poſition upon a Medium out of its direct Courſe; or otherwiſe how can it make the Sun appear in the Tropick to one under the Equinoctial, if he be always, as Mr. *Bamfield* ſays, really in the Equinoctial. He ſays, moreover, that the Refraction of the Sun and Stars is different; and that this Difference depends upon their Diſtance: I ſhould be glad if you would try, what Difference there is betwixt a Ray from the Sun, and a Ray from a Candle, when refracted through the ſame pellucid Medium; and, I fancy, it will give you ſufficient Satisfaction in that reſpect.

But, ſince I am got ſo far, it may not be improper, perhaps, to touch upon the chief Heads of his Letter publiſhed in the Diary; which, if you think it will be of any uſe, to prevent young Students from being perplexed with, and miſtaking bold Affirmation for mathematical Demonſtration, you are at Liberty to publiſh; and, in doing this, I ſhall not content myſelf with Mr. *Bamfield*'s Method of Affirmation and Negation, but ſhall confirm what I ſay, by the Teſtimonies of Authors of eſtabliſhed Reputation.

In the firſt Place then, he falls foul upon your Diary, by ridiculing the *Queſtions*; tho' the late Mr. *Sympſon*, and ſeveral other eminent Mathematicians, have allowed, that there have been more Mathematicians made by Publications of this kind, than by half the other mathematical Treatiſes in the Univerſe. —— In the next Place, he takes upon him to prove, that the Earth and Planets do not move in elliptical Orbits; and, by way of Demonſtration, he tells us, that our Antipodes will ſay that the Earth moves faſteſt in *June*, and not in *December*; but, as it does not appear that Mr. *Bamfield* has ever been to the Antipodes to aſk them, there is no reaſon to believe him, eſpecially when this Affirmation is contradicted by every body elſe (vide *Mac Laurin's* Account, Book III. Chap. I. *Gregory*'s Aſtronomy Vol. I. p. 70. *Keil*'s Aſtronomy p. 272, *&c.*) In the next Place he ſays, that an Inhabitant under the Equator would find no Difference in the Diſtance or Heat of the Sun in *June* or *December*. Very well: I ſuppoſe theſe People are pretty well caſe-hardened to the Climate; but they are hardly ſo blind as not to be able to tell when the Sun is over their Heads; which if it had not been upon the 22d *September* and 20th of *March*, does any body imagine that we ſhould not before now have heard ſo? Reaſons for this are given (in *Mac Laurin's* Account, Book IV. Chap. vii. Art. 18. *Keil's* Aſtronomy, p. 82. and *Gregory's*, Vol. I. p. 70.) which wholly overthrow all Mr. *Bamfield's* Superſtructure, for the Sun being in the Equinoctial on thoſe two Days, proves that he is eight Days longer on the North Side of the Equinoctial than on South Side; and therefore what he aſſerts concerning the Antipodes is falſe: Which Diſpoſition of all-wiſe Omnipotence

Qui mare & terras, variiſque mundum
Temperat horis, Hor.

was undoubtedly moſt favorable to theſe moſt fertile and inhabited Parts of the World; except Mr. *Bamfield* ſhould be pleaſed to deny this too.—— That what he ſays with regard to Parallaxes has no Meaning, I refer the Reader to *Mac Laurin's* Account, Book III. Chap. iii. Sect. 7 & 8. And with regard to the Equation of Time, this is demonſtrated by no leſs a Man than Dr. *Halley*, in *Keill's* Aſtronomy. With regard to the firſt of Mr. *Bamfield's* Schemes, it is no more than is allowed for Refraction by all good Aſtronomers (vide *Flamſteed's* Tables, *Halley's* Tables, or *Heath's* Royal Aſtronomer and Navigator). And the ſecond can be of no Weight, except he can prove, that the Sun *ſwims* upon *his* ſuppoſed Top of the Atmoſphere: For when the Atmoſphere is the loweſt, it is then the moſt denſe, and conſequently will have but a trifling Effect in varying the Refraction; for the Atmoſphere does not reflect the Sun's Rays all at once, as he imagines, but gradually, as the Air through which they paſs becomes more and more denſe; as it is conſidered in the Solution to the 11th Queſt.

And now, in order to convince the Reader of the Beauty, Regularity, Fitneſs and Truth of the preſent Philoſophy, I would recommend him to the ingenious Colin Mac Laurin's *Account of Sir* Isaac Newton's *Philoſophical Diſcoveries*; and let him compare this with ancient and modern Hypotheſis-Framers, Hebrew-mongers, Hutchinſonians, &c. and don't doubt but he will ſoon be ſenſible of the Modeſty, Candour and Judiciouſneſs of the one, and of the Enthuſiaſm, Prejudice and Folly of the others. —— I have no more to add, than that I am your Contributor to be depended upon,

Watnall School,
June 11, 1763.

Cha. Wildbore.

Answers to the Questions in the laſt Year's Diary.

(1) Queſt. 242. anſwered by Maſter *Francis Taylor*, Pupil at *Barton-School, Yorkſhire.*

$$\left.\begin{array}{rcrl} \text{Given } x+y & = & 1750 & = b \\ xz+yv & = & 22708 & = m \\ xv+yz & = & 12292 & = n \\ xzv+vzy & = & 159250 & = r \end{array}\right\} \text{Per Queſtion.}$$

1. By multiplying the firſt Equation by vz, and making it = the fourth, we have $vzb=r$; $\because z=\frac{r}{vb}$. 2. By exterminating x, in the firſt and ſecond Steps, we have $\frac{m-yv}{z}=b-y$, $\because yv-yz=m-zb$. 3. By multiplying the firſt Equation by v, and making it = to the the third, there reſults $yv-yz=bv-n$. 4. Art. 2d made = 3d, we get $m-zb=$

$bv-u$, ∵ $z = \frac{bn-bv+n}{b} = \frac{r}{vb}$; which, reduced, gives (by a Quadratic) $v = \overline{74dd - \frac{r}{b}}^{\frac{1}{2}} \pm \frac{1}{2} d = 7$.

$$z = \frac{r}{vb} \qquad = 13.$$

$$y = \frac{2b-m}{z-v} \qquad = 7.$$

$$x = b - y \qquad = 1743.$$

Conſequently, he was born *July* 13, 1743, at 7 o' Clock in the Evening.

The ſame anſwered by Mr. *Tho. Walker* (late of *Colnbridge, Yorkſhire)* but now of *Stanton-Bury*, near *Newport-Pagnel, Bucks.*

$$\left.\begin{array}{ll} \text{Per 1ſt Equat. } & x = a-y \\ \text{Per 2d, } & x = \frac{b-yv}{z} \\ \text{Per 3d, } & x = \frac{c-yz}{v} \\ \text{And per 4th, } & x = \frac{d}{x+7} \end{array}\right\} \begin{array}{l} \text{Alſo 4th Eq.} \div \text{per 1ſt, gives } vz = \frac{d}{a} \\ \because z = \frac{d}{va} = \frac{91}{v}\text{; And} \\ x-y = \frac{b-yv}{z} \because y = \frac{az-b}{z-v}. \\ \text{Again, } x-y = \frac{c-yz}{v} \because y = \frac{c-xv}{z-v}; \end{array}$$

And therefore $\frac{c+v-av}{a} = z = \frac{c-xv}{z-v}$; from which v is determined $= 13$; $x = 7$; and $y = 1743$; and not x, as it is printed.

The ſame anſwered by Mr. *John Eadon*, Maſter of the Free Writing-School, at *Sheffield*, in *Yorkſhire*.

Given $x+y = 1750 = a$, $xz + yv = 22708 = b$; $xv + yz = 12292 = c$; and $xzv + vzy = 159250 = d$. The firſt Equation tranſpoſed becomes $x = a - y$; then ſubſtitute $a-y$ for x in the other three Equations, they become $za - zy + vy = b$. $va - vy + zy = c$; and $zav = d$: the firſt and ſecond of theſe, added together. make $za + va = b + c$ ∵ $va = b + c - za$; and the third, divided by z, makes $va = \frac{d}{z}$; which two Values of va made equal, I get $\frac{d}{z} = b + c - za$; Reduced, $z = 13$, and $v = \frac{d}{za} = 7$; alſo $y =$ za

$\frac{za-b}{z-v}=7$; and $x=a-y=1743$. Therefore, he was born the 13th of *July* 1743, at 7 o'Clock at Night.

The ſame anſwered by Mr. *Richard Spakeman*, of *Lately-Common*, near *Leigh*, in *Lancaſhire*.

Divide the laſt Equation by the firſt, and $vz=91$; then add the ſecond and third Equations together, and divide their Sum by the firſt, and the Reſult is $v+z=20$. Now from theſe two Equations we get $zz-20z=-91$; whence $z=13$; and the Time that Mr. *Buddle* was born will be found to be in the Year 1743, on the 13th Day of *July*, at 7o'Clock in the Afternoon.

The ſame anſwered by Mr. *William Taylor*, of *Eckington*, in *Derbyſhire*.

From the Sum of the ſecond and third Equations ($xz+yu+xv+zy=s$) take the fourth Equation, $\div$ by v ($zy+xz=\frac{r}{v}$) the Remainder will be the firſt Equation ×'d by v, $\because s-\frac{r}{v}=av$, therefore $v=\frac{s}{2a}-\sqrt{\frac{s^2}{4}-\frac{r}{a}}=7$; whence $x=1743$; $z=13$; and $y=7$. Anſwering to 1743, *July* 13, at 7 at Night.

Mr. *Tho. Sadler*, near *Wrenbury*, in *Cheſhire*, anſwers the ſame, as under.

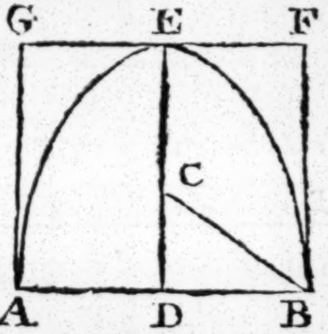
Let the four given Numbers be repreſented by a, b, c, and d; then by the firſt Equation $x=a-y$, which Value being ſubſtituted in the other three, gives $az-yz+yv=b$. $av-vy+yz=c$. $azv-vzy+vzy=d$. By Tranſpoſition, $az=c-av+b$; and $azv=d$ $\because z=\frac{c-av+b}{a}=\frac{d}{av}$. Which Equation properly ordered gives $av^2-cv-bv=-d$. $v^2=\frac{cv-bv}{a}=-\frac{d}{a}$. Subſtitute $s=\frac{cv-bv}{a}$; then $v^2-\frac{sv}{2}+\frac{s^2}{4}=\frac{s^2}{4}-\frac{d}{a}$. Solved, $v=\sqrt{\frac{s^2}{4}-\frac{d}{a}}=7$. Conſequently, Mr. *Buddle* was born on *July* 13, at 7 H. paſt Noon, 1743; and is aged 20 Years, 1763.

Meſſrs. *Tho. Baker*, *Job Gibbons*, *Stephen Hartley*, *Stephen Hodges*, *Jacob de Epſom*, *William Kingſtone*, *Alexander Maule*, *J. Peacock*, *Thomas Quanbrough*, *Thomas Robinſon*, *Thomas Sanderſon*, *Edward Smith*, *Joſeph Webſter*, *Thomas Wilkin*, and *James Young*, ſent Solutions to this Queſtion; to all which ingenious Gentlemen we own ourſelves greatly obliged.

(2) Queſt. 243, anſwered by Mr. *St. Hartley*, of *Sowerbybridge*.

Let $2x =$ the Ordinate, and y the Abſciſſa: $\frac{4xy}{3} = \overset{A}{16} = 160$ Ch. & $ay = 120$ Ch. $= a$, $\because \frac{a}{x} = y$. By the Writers on Fluxions, $\frac{2y}{5}$ is the Center of Gravity of the Parabola: But, by the Queſt. $\frac{2a}{5x} \times \frac{x}{2} = \frac{a}{5} = 24$ Ch. $=$ the Area and Perimeter of the Triangle required; whoſe three Sides call b, c, and d, (per 47 *Eu.* 1.) $b^2 = c^2 + d^2$. But $c + d = 24\ (z) - b$, $\because c^2 + 2cd + d^2 = z^2 - 2zb + b^2$, by compariſon, $2cd = z^2 - 2bz \because cd = \frac{z^2 - 2bz}{2}$. But, $cd = 2z$; therefore $4z = z^2 - 2bz \because b = \frac{z-4}{2} = 10$, and therefrom $c = 8$; $d = 6$; the Ordinate of Parabola $= 16$, and the Abſciſſa 15 Chains reſpectively.

The ſame anſwered by Mr. *Tho. Wilkin*, Writing-Maſter and Accomptant, in *Hexham*, *Northumberl.*



Let $x = 160$ Chains the Area of the Parabola; and put $x =$ DB; then from the Property of the Parabola $\frac{3z}{4x} =$ DE, and (per *Hodgſon's* Fluxions, p. 376.) $\frac{3z}{10x} =$ DC, the Diſtance of the Center of Gravity from the Point D, then will $\sqrt{\frac{9z^2}{100x^2} + x^2} =$ BC; and (per Data) $\sqrt{\frac{9z^2}{100x^2} + x^2} + \frac{3z}{10} + x = \frac{3z}{20}$; this Equation, ordered and put into Numbers, is $4800x^2 - 67200x = -230400$. By completing the Square, x is found $= 8$; then will DC $= 6$; BC $= 10$; AB $= 16$, and DE $= 15$; and the Area of the Pond $=$ 2 A. 1 R. 24 P.

The ſame anſwered by Mr. *Stephen Hodges*, of *Althorp*, near *Northampton*.

Put $x = \text{AD}$ (ſee laſt Fig.) $=$ ſemiordinate; $y = \text{ED}$; and $a = 16$ Acres $= 160$ Chains, $\because \frac{4xy}{3} = a \because xy = \frac{3}{4}a = 120 = b$; and (from p. 375. of *Hodgſon's* Fluxions) the Center of Gravity is known $\because \frac{2b}{5x} = \text{DC}$. But $\frac{2b}{5x} \times \frac{x}{2} = \frac{b}{5} = 24 =$ Area of the $\triangle$ADC $\because x = 8$; DC $= 6$, BC $= 10$, and ED $= 15$.

The ſame anſwered by Mr. *Thomas Walker*.

Put AB $= 2x$ (ſee laſt Fig.) ED $= y$; Area AEB $= 160$Ch. $= a$; and (per Conics) $\frac{4xy}{3} = a$. Therefore $xy = \frac{3a}{4} = 120 = b$. Whence (from known Principles) the Center of Gravity C is determined. Therefore $\frac{2b}{5x} = \text{DC}$. But $\frac{2b}{5x} \times \frac{x}{2} = \frac{b}{5} =$ Area of the $\triangle$ BCD: whence is determined $x = 8$; DC $= 6$; BC $= 10$, and ED $= 15$.

The ſame anſwered by Mr. *Tho. Quanbrough*, of *Grantham*, *Lincolnſhire*.

Let $x = \text{ED}$ (ſee Fig. before) $2a = 240$ Square Chains $=$ the Area of the Parallelogram GABFG; then will $\frac{a}{x} = \text{DB}$; and (as the Point C is the Center of Gravity of the Parabola AEB) $\frac{2a}{5} = \text{CD}$; conſequently $\sqrt{\frac{4x^2}{25} + \frac{a^2}{x^2}} + \frac{2x}{5} + \frac{a}{x} = \frac{a}{5}$; which (by Tranſpoſition, and ſquaring both Sides of the Equation) becomes $\frac{a^2}{25} - \frac{4ax}{25} - \frac{2a^2}{5x} + \frac{4a}{5} = 0$. Whence $4x^2 - \overline{a + 20}$, $x = 10a$. In Numbers $4x^2 - 140x = -1200$; or, $x^2 - 35x = -300$. Solved, $x = 17{,}5 \pm \sqrt{6{,}25} = 15$ or 20 Chains, either of which Numbers will anſwer the Conditions of the Queſtion.

I

The ſame anſwered by Mr. *Thomas Robinſon*, of *Biddick*, near *Durham*.

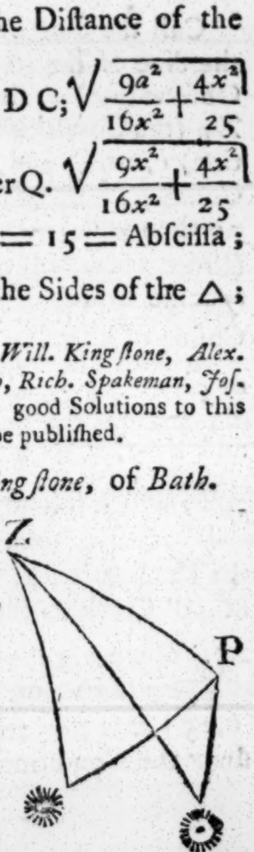
Put $b = 240$ Ch. the Rectang. of Abſciſſ. and Ordin. $x = ED$ (ſee laſt Fig.) $\because \frac{2x}{5} = CD$, and $\frac{b}{2x} = DB$; then (per *Eu*.47.1.) $\sqrt{\frac{4x^2}{25} + \frac{b^2}{4x^2}} = \sqrt{\frac{16x^4 + 25b^2}{100x^2}} = CB$; then $\frac{x}{5} \times \frac{b}{2x} = \frac{b}{10} = 24 =$ the Area of the triangular Fiſhpond, put $= d \therefore \frac{2x}{5} \times \frac{b}{2x} = \frac{4x^2 + 5b}{10x} + \sqrt{\frac{16x^4 + 25b^2}{10x^2}} = d$; which Equation, reduced and in Numbers, $x^2 - 35x = -300$; whence $x = 20$ Chains $= ED$ the Abſciſſa; and Ordinate $= 12$ Chains; then 6, 8 and 10 Chains are the Dimenſions of the Side of the Fiſhpond required.

The ſame anſwered by the Rev. Mr. *J. Peacock*.

Putting $a = 160$ Ch. $=$ the Area; $x = DE$ (ſee Fig.) then $\frac{3a}{2x} = AB$, $\frac{3a}{4x} = AD$, and $\frac{3x}{4} = EC =$ the Diſtance of the Center of Gravity from the Vertex $\frac{2x}{5} = DC$; $\sqrt{\frac{9a^2}{16x^2} + \frac{4x^2}{25}} = BC$; $\frac{6ax}{40x} = 24 = b =$ Area of the $\triangle$ per Q. $\sqrt{\frac{9x^2}{16x^2} + \frac{4x^2}{25}} + \frac{3a}{4x} + \frac{2x}{5} = b$. From whence $x = 15 =$ Abſciſſa; greateſt Ordinate $= 16$; 6, 8 and 10 $=$ the Sides of the $\triangle$; and its Area $= 2{,}4$ Acres.

Meſſrs. *T. Barker*, *John Eadon*, *Jacas de Epſom*, *Will. Kingſtone*, *Alex. Maule*, *Tho. Sadler*, *Tho. Sanderſon*, *Edw. Smith*, *Rich. Spakeman*, *Joſ. Webſter*, *James Young*, and ſeveral others, ſent good Solutions to this Queſtion; which, for Want of Room, cannot be publiſhed.

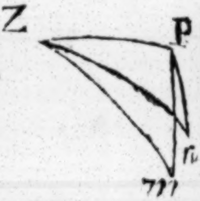
(3) Queſt. 244, anſwered by Mr. *W. Kingſtone*, of *Bath*.



Let x and $y =$ Sine and Coſine of the Azimuth at the firſt Obſervation $= PZ\odot$: s and $c =$ Sine and Coſine Lat. $= 55° 34'$ m and $n =$ thoſe $\odot Z = 86° 1'$; b and $d =$ thoſe of $\ast Z = 81° 46'$. p and q thoſe of $\ast Z \odot = 7° 14'$: Whence, by *Spherics*, we have $xq + yp$ and $qy - px =$ Sine and Coſine of $\ast ZP$, and $ns - mcy = sd - cbqy - cpbx \because cpbx + cbqy - mcy = sd - ns \therefore bpx + bqy - my = \frac{s}{c} \times \overline{d - s}$. But $y =$

$\sqrt{\overline{1-x^2}}$; and putting $r=\frac{bp}{bq-m}$ and $e=\frac{\frac{s}{c}\times\overline{d-s}}{bq-m}$, we ſhall have $rx\sqrt{\overline{1-x^2}}=e$ ∴ $rx-e=\sqrt{\overline{1-x^2}}$ ∴ $1-x^2=r^2x^2-2rex+e^2$ ∴ $r^2x^2+x^2-rex=1-e^2$ ∴ $x^2-\frac{2rex}{1+r^2}=\frac{1-e^2}{1+r^2}$, and by C. □ we have $x^2-\frac{2rex}{1+r^2}+\overline{\frac{r^2e^2}{1+r^2}}^2=\frac{1-e^2}{1+r^2}+\overline{\frac{r^2e^2}{1+r^2}}^2=\frac{1+r^2-e^2}{\overline{1+r^2}^2}$ ∴ $x=\frac{-re}{1+r^2}=\sqrt{\frac{1+r^2-e}{1+r^2}}$ ∴ $x=\frac{re\mp\sqrt{\overline{1+r^2c^2}}}{1+r^2}=0{,}784709$ or ,914377; that is, 51° 42′, or 66° 7′, from whence the Sun's Declination will come out near 24°. But this is impoſſible.

The ſame anſwered by *Burtonienſis*, the Propoſer.



Call the Sine of ZP, a; its Coſine b; the Sine of Zn (the Co-altitude at the firſt Obſervation) c, its Coſine d; the Sine of Zm (the Co-altitude at the ſecond Obſervation) h, its Coſine f; Sine of 7° 14′ p, its Coſine q; Sine of the < nZP, x; its Coſine y; then will $qy-px$ = the Coſine of the < mZP; and (by (Prop. 26. p. 73. of *Simpſon's* Trigonometry) $\overline{qy-px}\times ab+bf$ = the Coſine of mP (the Co-declination) and $acy+bd$ = Coſine of nP = Zm; therefore $\overline{qy-pa}\times ab+bf=acq+bd$; or $\overline{qb-c}\times y=\overline{d-f}\times\frac{b}{a}$; or (by putting $qb-c-rph=s$, and $d-f,\times\frac{b}{a}=k$, and $\sqrt{\overline{1-x^2}}$ for y) $r\sqrt{\overline{1-y^2}}-sy=k$; which ſolved gives $=\sqrt{\frac{\overline{r^2-k^2}\times\overline{r^2+1}\times 2+s^2k^2\times 2-2sk}{2\times\overline{r^2+1}}}$ the Declination 23° 29′, and the firſt Obſervation was made at 4 o' Clock in the Morning.

(4) Queſt. 245, anſwered by Mr. *W. Kingſtone*, of *Bath*.

Let x = the Sine of the Sun's Altitude $\sqrt{\overline{1-x^2}}$ = its Coſine. then (by the Problem) $\frac{x^2+1-x^4}{x\sqrt{\overline{1-x^2}}}=\frac{1}{x\sqrt{\overline{1-x^2}}}$ a

Maximum, and in Fluxions is $\frac{4x^3\dot{x}-2x\dot{x}}{x^2-x^4}=0 \;\therefore\; 2x^2-1=0$ $\therefore\; 2x^2=1=$ the verſed Sine of double the Sun's Altitude; whence the Altitude $=45°$, and Declination $=22° \; 30'$. Whence the Lat. is 32° 46′; and the Time 8h 40′ 14″ in the Morning, either *June* 4, or *July* 8.

The ſame anſwered by Mr. *Stephen Hartley*:

Given $\frac{x^2+y^2}{x}=\frac{1}{xy}$ a Max. where x and $y=$ the Nat. Sine and Coſine of the Sun's Altitude, Rad. being $=1$. In Fluxions $\frac{-x\dot{y}-y\dot{x}}{x^2y^2}=0$. But $\dot{x}=-\frac{y\dot{y}}{x}$; by ſubſtituting $x\dot{y}-\frac{y^2\dot{y}}{x}=0$. Therefore $x^2=y^2 \;\therefore\; x=y=$ the Sine of 45°. Hence, by com. Spherics, tbe Lat. is found $=32° \; 46'$. The Time of the Day 8h 41′ 28″, *June* 4, 1763.

The ſame anſwered by Mr. *Tho. Robinſon*.

Put $x=$ Sine $\odot$'s Alt. at Eaſt, $y=$ the Coſ. Rad. $=1$. Then (by Queſt.) $\frac{x^2+y^2}{xy}$ is a Max. In Fluxions, $x^2y\dot{y}+xy^2\dot{y}-x^3\dot{y}-y^3\dot{x}=0 \;\therefore\; y+x=x^3+y^3$. Now $y=\sqrt{1-x^2}$; and x^2+y^2-1; which ſubſtitute in the former Equation, and we ſhall have $\sqrt{1-x^2}+x=x^3+\overline{1-x^2}\sqrt{1-x^2}$ Reduced, and divided by (x) $x^4-1.5x^2=-5$. Whence $x=\sqrt[4]{\sqrt{,5625-,5}\pm,75}=,707106=45°$, the $\odot$'s Alt. when due E. The $\odot$'s Decl. 22° 30′, anſwering to *July* 5. Then, as Sine 45° to Rad. 90°, : : Sine 22° 30′ to Sine 32° 46′ N. Lat. whence the Sun was due E. 40′ paſt 8 in the Morn.

The ſame anſwered by Mr. *Stephen Hodges*.

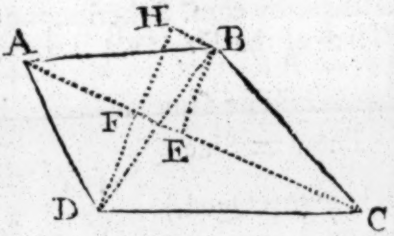
Let x and $y=$ Sine and Coſine of the Alt. ſought; then will $\frac{x^2+y^2}{xy}=$ a Maximum; but $x^2+y^2=1, \;\therefore\; \frac{1}{xy}$ is a Max. alſo. Which, thrown into Fluxions and reduced, gives $x^2=y^2 \;\therefore\; x=y$; anſwering the Sine of 45°, and the Sun's Declination $=22° \; 30'$. Hence the reſt becomes known.

Mr. *R. Spakeman* anſwers the ſame thus:

Put x for the Sine of the Sun's Altitude; then, the Coſ. is $\sqrt{rr-xx}$ and (by Queſt. we have $\frac{rr}{\sqrt{r^2x^2-x^4}}$ for a Max. which, thrown into Fluxions and reduced, gives $x=\frac{r}{\sqrt{2}}$ $=,707106=$the nat. Sine of 45° $=$the Sun's Altitude, and the Declination is 22° 30′: From whence it will be found, that the Sun will be due Eaſt on the 5th Day of *June*, and on the 8th Day of *July*, in the Lat. of 32° 25′, at 8 o' Clock and 41′.

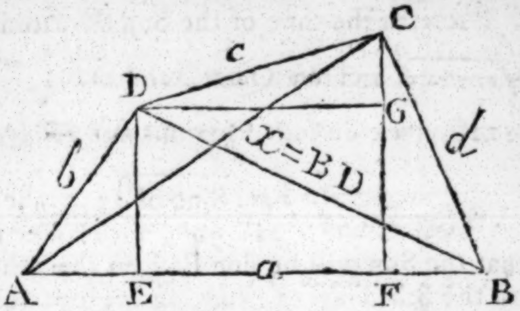
Several other ingenious and worthy Contributors ſent good Solutions to this Queſtion; which, for Brevity's Sake, cannot be inſerted.

(5) Queſt. 246, anſwered by Mr. *W. Kingſtone.*



Let fall the Perpendiculars BE and DF, continue DF to H, making DH$=$DF$+$BE, and draw BH parallel to AC; Let $a=$AB, $b=$BC, $c=$DC, $d=$AD, $2x=$AC, $2z=$BD; then as $2x : a+b :: a-b : \frac{a^2-b^2}{2x}=$Diff. of the Segments $\therefore x-\frac{a^2+b^2}{4x}=\frac{4x^2-a^2+b^2}{4x}$ $=$EC; and, as $2x : c+d :: c-d : \frac{c^2-d^2}{2x}$; $=$Diff. of the Segments $\therefore x-\frac{c^2+d^2}{4x}=\frac{4x^2-c^2+d^2}{4x}=$AF. Now $2x-\frac{4x^2-a^2+{}^2b+4x^2-c^2+d^2}{4x}=\frac{a^2+c^2-b^2-d^2}{4x}=FE=$HB $=\frac{s}{4x}$. And (by 47 *Eu.* 1.) we have $\overline{BD}^2-\overline{BH}^2=\overline{DH}^2$ $\therefore$ DH$=\sqrt{\frac{4z^2-s^2}{16x^2}} \therefore \sqrt{\frac{4x^2z^2-s^2}{16}}=\sqrt{2xz+\frac{s}{4}\times\overline{2xz-\frac{s}{4}}}$ $=$ the Area: Again, $\sqrt{\overline{\frac{a+b}{2}}^2-x^2\times x^2-\overline{\frac{a+b}{2}}^2}$ $=$ Area of the △ ABC, and $\sqrt{\overline{\frac{c+a}{2}}^2-x^2\times x^2-\overline{\frac{c+d}{2}}^2}$ $=$ Area of the △ ACD; from whence the Numbers may be found.

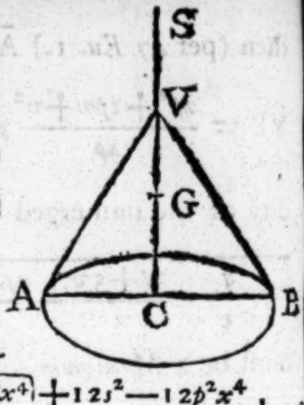
The ſame anſwered by Mr. *J. Goodhead*, of *Nottingham*.



Let ABCD repreſent the Trapezium, whoſe Sides AB, AD, CD and BC, call a, b, c and d reſpectively ; put $m=$ AC—BD, the Difference of the Diagonals, draw DE and CF perpendicular to AB, and DG parallel thereto : put x $=$the leſſer Diagonal ; then will $x+m=$the greater, and we ſhall have AB : BD$+$AD : : BD—AD : BE—AE, that is, $a : x+b : - xb : \frac{x^2-b^2}{a}=BE-$AE ; conſequently $\frac{a^2-x^2+b^2}{2a}=$AE ; again, AB : AC $+$ BC : : AC — BC : AF — BF, that is, $a : x+m+d : : x+m-d : \frac{x^2+2mx+m^2-d^2}{a}=AF-$BF, conſequently $\frac{a^2+d^2-x^2-2mx-m^2}{2a}=$BF ; put s^2 for $a^2+d^2-m^2$ in the laſt Expreſſion, then will $\frac{s^2-x^2-mx}{2a}=$ BF, and (per 47 *Eu.* 1.) $\frac{\sqrt{a^2d^2-s^4+2s^2x^2+4s^2mx-x^4-4mx^3-4m^2x^2}}{2a}=$FC; after the ſame manner DE will be found $=\frac{\sqrt{\overline{a^2+b^2}\times 2x^2-\overline{a^2-b^2}^2-x^4}}{2a}$ now it is evident that DG$=$EF is alſo $=\frac{a^2-b^2-s^2+2x^2+2mx}{2a}$ (=AB—AE—BF) therefore $\sqrt{\overline{DC}^2-\overline{DG}^2}=$CG; that is, $\sqrt{4a^2c^2-\overline{a^2-b^2-s^2+2x^2+2mx}^2}=\sqrt{4a^2d^2+4mx+2x^2-s^2\times s^2-4m^2x-4mx^3-x^4}-\sqrt{\overline{a^2+b^2}\times 2x^2-\overline{a^2-b^2}^2-x^4}$; from hence x may be found ; but, as I have neither Leiſure nor Inclination to go through with the Reduction of the above Equation, deſire to be excuſed from purſuing it any farther till another Opportunity.

Many other Solutions have been received to this Queſtion, from our ingenious Contributors.

(6) Queſt. 247, anſwered by Mr. *T. Robinſon.*



Put SV $= g$, ſuſpended at S; $x =$ AC $=$ Rad. of the Baſe, $b = 3{,}1416$, $px = \frac{1}{2}$ Circumference of the Baſe; $s =$ Convex Surface $\because \frac{s}{px} =$ AV $=$ VB (by *Eu.* 47. 1.) $\sqrt{\frac{s^2 - p^2x^4}{p^2x^2}}$ the Cone's Altitude VC; now, by *Emerſon's* Flux. p. 319,

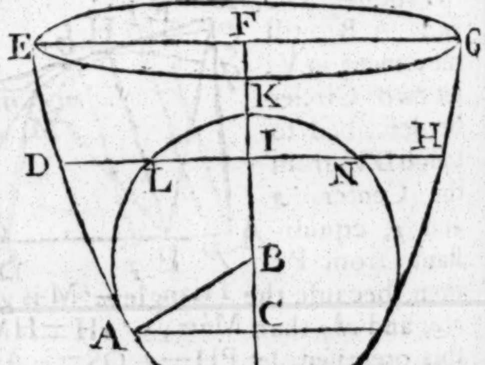
$$\frac{20g^2 + 30g\sqrt{\frac{s^2-p^2x^4}{p^2x^2}} + \frac{12s^2 - 12p^2x^4}{p^2x^2} + 3x^2}{20g + 15\sqrt{\frac{s^2-p^2x^4}{p^2x^2}}}$$

$=$ SG $=$ the Diſtance of the Center of Oſcillation from that of Suſpenſion, which is a *Minimum*; but, when SV $= g$ becomes $= 0$; then $\frac{12s^2 - qp^2x^4}{15p^2\sqrt{s^2 - p^2x}}$ a *Minimum*; this, in Fluxions and reduced, $\frac{x^8 + s^2x^4}{p^2} = \frac{180s^4}{135p4}$. Compleat the Square $x^8 + \frac{s^2x^4}{p^2} + \frac{s^4}{4p^4} = \frac{355x4}{540p4} \because x = \sqrt[4]{\frac{s^2}{p^2}\sqrt{\frac{855}{540}} - \frac{s^2}{2p^2}}$ the Radius of the Cone's Baſe; whence the Altitude may be found as required.

It is hoped the above Solution will ſatisfy the mathematical World, tho' different from many of the other ingenious ones received.

(7) Queſt. 248, anſwered by Mr. *G. Brown*, of *Portſm. Com.*

Put $q = 3{,}416$; EG $= 10$ Inches VF $= 25 = b$, $p =$ Parameter of the parabolic Glaſs EVG; VI $= x =$ Height of the Water by the Immerſion of the Ball MC $= \frac{v}{2}$ then (per Property of Curve) BC $= \frac{p}{2}$, and BM $=$ AB $= \frac{p+v}{2} =$ Radius of the Ball,

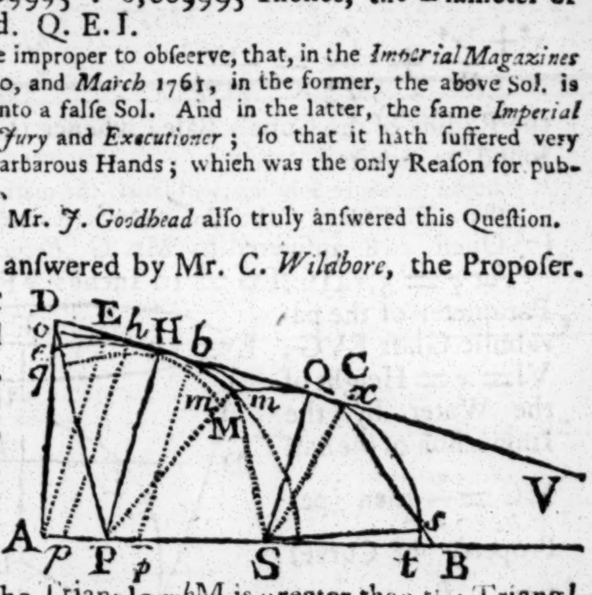


then (per 47 *Eu.* 1.) $\overline{AC}|^2 = \frac{2pv+v^2}{4}$, $VC = \frac{2pv+v^2}{4p}$ $VB = \frac{2p^2+2pv+v^2}{4p}$; and $IM = \frac{4px-v^2}{4p}$; and the Solidity of the immerged Segment LMN is $\frac{q\overline{IM}|^2}{3} \times \overline{3AB-IM}$ i. e. $\overline{\frac{q}{3} \times \frac{3p+3v}{2} - \frac{4px+v^2}{4p}} \times \overline{\frac{4px-v^2}{4p}}|^2$ which (per Qu.) muſt be a *Maximum*. Make v flow, and we ſhall have $4px - v^2 - 4pv = 0 \because x = \frac{v^2+4pv}{4p}$; hence $IM = v - z$, MC and $IK = p$, viz. the Height of the Segment of the Ball above the Water, is always equal to the Parameter of the parabolic Glaſs, a Thing very remarkable. Therefore the Solidity of the Segment LMN + Water = Solidity of the Conoid DVH, i. e. $\frac{q}{6} \times \overline{3pv^2+v^3+a^2b} = q \times \overline{\frac{v^2+4pv}{32p}}|^2$ therefore $3v^4+pv^3 = 16p^2b^2$, in Numbers $3v^4+8v^3 = 10000$. Solved, $v = 7,009995 \because 8,009995$ Inches, the Diameter of the Ball required. Q. E. I.

Note. It may not be improper to obſeerve, that, in the *Imperial Magazines* for *December* 1760, and *March* 1761, in the former, the above Sol. is metamorphos'd into a falſe Sol. And in the latter, the ſame *Imperial* Critic is *Judge*, *Jury* and *Executioner*; ſo that it hath ſuffered very much from his barbarous Hands; which was the only Reaſon for publiſhing it *de novo*.

Mr. *T. Barker* and Mr. *J. Goodhead* alſo truly anſwered this Queſtion.

(8) Queſt. 249, anſwered by Mr. *C. Wildbore*, the Propoſer.



Produce DC and A B, till they meet in V, let two Circles be deſcribed to touch DV, from the Centers p and p, equidiſtant from P; then, becauſe the Triangle $m b M$ is greater than the Triangl oke, and ebq than Mbm; $\because$ $eH = HM$, and $\angle ePH = HPM$ this premiſed, let $PH = x$; $QS = y$; $AE = a$; $AV = b$; s &c. =

the Sine and Coſ. of DAP; m and n of HPV; then (per ſim. Δ's) $a : x :: b : \frac{bx}{a} =$ AP (per Trig.) $x : s :: b - \frac{bx}{a} : \frac{bs}{x} - \frac{bs}{a}$ the Sine AeP, let this $= v$, and its Coſ. $= u$, $\frac{bs}{a} = \gamma$; then $x = \frac{bs}{v-\gamma}$, alſo (per Trig.) $s.e$PA$= cu - sv$. $s.e$PH$= msu + mcv + ncu - nsv$ and Coſ. $= -nsu - ncv + mcu - msv$; alſo $-2mnsu - 2mncv + m^2cu = m^2sv - n^2cu + n^2sv =$ the Sine; and $su + cv + nmsv - mncv =$ the Coſ. of MPS; but PS$= \frac{x-y}{n}$: PM$+$MS$= x+y$ :: PM $-$ MS$= x-y : n \times \overline{x+y} =$ the Diff. of the Segments of PS; whence (per Trig.) $\frac{x-y-n^2x-n^2y}{2y} =$ the Coſ. and $\sqrt{\overline{1-\overline{\frac{m^2x}{2y}-\frac{1+n^2}{2}}\big|^2}}$ $=$ the Sine MSP; and $\frac{x-y+n^2x+n^2y}{2x}$ the Coſ. of MPS. This, made equal to the other Value of the ſame, found above, gives $y = \frac{sb}{m^2 \times \overline{v+\gamma}} \times \overline{1+n^2-2su+2cv+2nmsv-2mncv}$; and $\dot{y} = \frac{sb}{m^2 \times \overline{v+\gamma}} \times \overline{\frac{2svb}{a} + 2c\dot{v} + 2nvsv - 2mnc\dot{v}} - \frac{sb}{m^2 \times \overline{v+\gamma}\big|^2} \times \overline{\dot{v} + n^2\dot{v} - 2su\dot{v} + 2cv\dot{v} + 2msnv\dot{v} - mncv\dot{v}}$. Let this (for the ſake of Brevity) $= Z\dot{v}$; and $\dot{x} = \frac{-sb\dot{v}}{\overline{v+\gamma}\big|^2} = -W\dot{v}$; but to proceed: if o and $p =$ the Sine and Coſine of CBS, and $\frac{y}{n} - e =$ SB, $\frac{o}{n} - \frac{eo}{y} =$ Sine, and $\sqrt{1-\overline{\frac{o}{n}-\frac{eo}{y}}\big|^2}$ $=$ Coſ. of BsS, $p\sqrt{1-\overline{\frac{o}{n}-\frac{eo}{y}}\big|^2} - \frac{o^2}{n} + \frac{o^2e}{y} = s$. sSt $\overline{1-2\times\frac{o}{n}-\frac{oe}{y}}\big|^2 = s$; rSs, and $\frac{mop}{n} - \frac{mopw}{y} - mo\sqrt{1-\overline{\frac{o}{n}-\frac{oe^2}{y}}\big|^2} + np\sqrt{1-\overline{\frac{o}{n}-\frac{oe}{y}}\big|^2} - o^2 + \frac{no^2e}{y} =$ Sine of QSr; and now we have ſufficient Data to expreſs the

Triangle A*c*P + Sector *e*PM + △PMS + Sect. MSQ + Sect. QS*r* + △*r*S*s* + Sect. *s*S*t*, a Maximum; this, thrown into Fluxions &c. gives $\frac{cu-sv}{2}\times\overline{\frac{-sb^2}{\overline{v+\gamma}|^2}+\frac{2s^2b^2}{n\times\overline{v+\gamma}|^3}}+-\frac{\frac{cv}{u}-s}{2}$

$$\times\overline{\frac{sb^2}{v+\gamma}-\frac{s^2b^2}{n\times\overline{v+\gamma}|^2}}+\frac{2As^4b^2}{\overline{v+\gamma}|^3}+\frac{s^2b^2}{\overline{v+\gamma}|^2}\times$$

$$\frac{-\frac{msv}{2e}+mc-\frac{ncv}{u}-ns}{-nsu-ncv+mcu-msv}+\frac{s^2b^2}{2nm^2\times\overline{v+\gamma^2}|^3}\times-$$

$$\overline{\frac{2sv}{u}+2c+2mns-2nmc\times v+\gamma-2\times 2n^2+2su+2cv+2mnsv-2mncv}$$

$$\times-2mnsu-2mncv+m^2cu-m^2sv-n^2cu+n^2sv+\frac{s^2b^2}{2nm^2\times\overline{v+\gamma}|^2}$$

$$\times\frac{2mnsv}{u}-2mnc-\frac{m^2cv}{u}-m^2s+\frac{n^2cv}{u}-+n^2s$$

$$\overline{\times 2n^2+2su+2cv+2mnsv-2mncv}+\frac{yZB}{2}+\frac{2y^2m}{2M}\times$$

$$\frac{-Wy-Zy+mn^2Wy-n^2yZ-Z\times\text{Coſ. M}s\text{P}}{\frac{\frac{-m^2Wy-m^2xZ}{y^2}\times\overline{\frac{m^2x}{4y}-\frac{\overline{1+n^2}}{4}}}{\frac{1}{n}\times s\,\text{MSQ.}}}+\frac{ny^2}{2M}\times-\frac{4y^2}{}\quad+yZC+\frac{y^2}{2N}\times$$

$$\frac{\frac{poeZ}{y^2}\times\overline{\frac{o}{n}-\frac{oe}{y}}-\frac{o^2ez}{y^2}}{\sqrt{1-\overline{\frac{o}{n}-\frac{eo}{y}}|^2}}+yZ-\frac{oZ}{n}\times\overline{\frac{oy}{n}-oe}+DyZ+$$

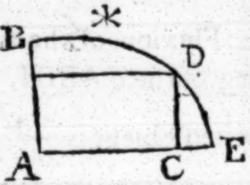
$$\frac{y^2}{2Q}\times\frac{\overline{\frac{mopez}{y^2}-\frac{no^2ez}{y^2}-\overline{mo-np}\times\frac{-oeZ}{2}\times\frac{o}{n}-\frac{oe}{y}}}{\sqrt{1-\overline{\frac{o}{n}-\frac{oe}{y}}|^2}}=0,$$

where B is the Arch and M the Coſ. of ∠ MSQ to Rad. 1. A = Arch of *e*PH, C and N of *s*S*t*, D and Q of QSR; in which

Equation reſtoring the proper Quantities given above, we get $v=,3018$ the Sine of 17° 34′. Whence $AP=,473$ which was required.

Note, The whole Operation would take up ſeveral Pages of the DIARY.

(9) Queſt. 250, anſwered by Mr. *Tho. Allen*, of *Spalding*, the Propoſer.



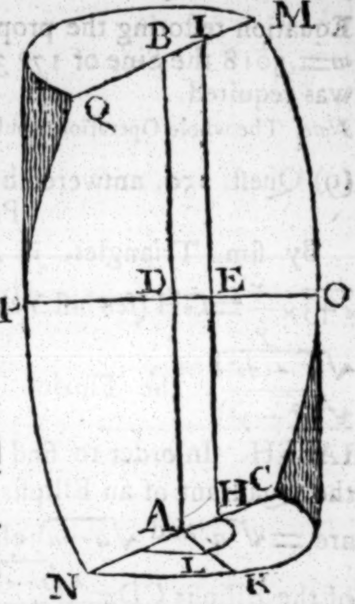
By ſim. Triangles, $\dot{y}:\dot{x}::c+y:\overline{c+y}\times\frac{\dot{x}}{\dot{y}}=GH$ (ſee laſt Year's Fig.) ∴ $\frac{c\dot{y}\sqrt{a^2-dy^2}}{\sqrt{a^2-y^2}}$, the Fluxion of the Area IABEH. In order to find the Fluent thereof, let BDE* be the Quadrant of an Ellipſis, whoſe Semi-Axes AE and AB are $=\sqrt{a}$ and $\sqrt{a-d}$ reſpectively, then, by the Properties of the Ellipſis $CD=\sqrt{\frac{a-d}{a}}\times\sqrt{a-y^2}$. In Fluxions is $\sqrt{\frac{a-d}{a}}\times\frac{-r\dot{y}}{\sqrt{a-y^2}}$, therefore *ſq. Flux. of* AC + *ſq. Flux.* of CD will be $=\frac{a^2\dot{y}^2-dy^2\dot{y}^2}{a^2-ay^2}$, whoſe ſquare Root is $\frac{\dot{y}\sqrt{a^2-dy^2}}{\sqrt{a^2-ay^2}}$; which laſt Expreſſion being equal to *that* of the Fluxion of the Area, ×ed by c; it follows, that the Area of the Space IABEH (ſee Fig. annexed to the Queſt.) will be truly repreſented by $\frac{y^3}{3}+c\times$ *elliptic Arc* BD. Now when y is $=\sqrt{a}$; OH becomes infinite; the *whole* Fluent of $\frac{\dot{y}\sqrt{a^2-dy^2}}{\sqrt{a^2-ay^2}}=$ the elliptic Quadrant BDE, and the Area of the Space $IABCK=\frac{a^{\frac{3}{2}}}{3}+c\times$ *elliptic Quadrant* BDE.

Meſſrs. *G. Brown* and *Alex. Maule* ſent good Solutions to this Queſtion; which we cannot publiſh, for Want of Room.

(10) Queſt. 251, anſwered by Mr. *G. Brown*, the Propoſer.

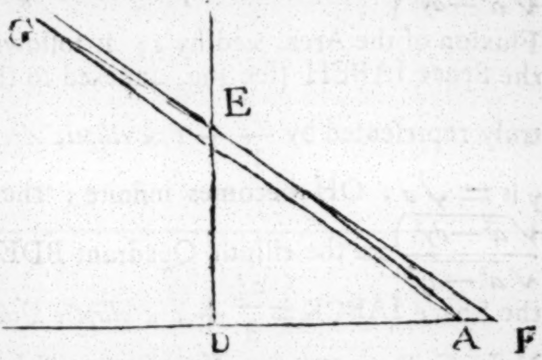
Let AB repreſent the Axis of the given Cylinder NPQ and COM the two Spirals diametrically oppoſite and exactly half around, PO the deſcribing Line &c. Put the Radius AC = 6 Inches, $=r$, $AB=20=b$, arch $CK=c$, Rad. AH =

DE



DE = BI = x; then as $r : c :: x :$ $\frac{cx}{r}$ = Arch HL and HI = $\frac{\sqrt{r^2b^2+c^2x^2}}{r}$, which being ×ed by $\dot{x}$ will give $\dot{x}\frac{\sqrt{r^2b^2+c^2x^2}}{r}$ = Fluxion of the twiſting dividing Surface ABIH, and the corrected Fluent is $\frac{x}{2r}\sqrt{r^2b^2+c^2x^2}+\frac{rb^2}{2c}\times$ Hyp. Log. $\frac{cx+\sqrt{r^2b^2+c^2x}}{rb}$ and when $x=r$; $c=9{,}4248$ (per Qu.) and we ſhall have $r\sqrt{b^2+c^2}+\frac{rb^2}{c}\times$ H. L. $\frac{c+\sqrt{c^2+b^2}}{b}=248{,}6079$ ſquare Inches, the required Meaſure of the twiſting dividing Surface NPQMOE.

(11) Queſt. 252. anſwered by Mr. *Cha. Wildbore.*



Suppoſe GEA the Ray of Light ſtriking the Spectator's Eye at A; EF a Tangent to it at E; let the Denſity of the Air at the Surface be called Unity, then will the Denſity at any Height or $7x$ be $\frac{1}{4}^{x}$ according to what I have ſaid in DIARY 1762, p. 30. And it has been found, by Experiments made upon Bodies of the ſame Nature differing only in Denſity (vide NEWTON's *Optics*) and likewiſe by mixing Salt and Water together (ſee the *Principia*) that the Force to refract the Rays of Light is as the Denſity of ſuch pellucid Medium: let s be the

Sine of the Difference of the Angles of Incidence and Refraction at A, this being (as is eaſy to demonſtrate) as the Power of the Medium upon the Ray, or its Effect to inflect the Ray towards the Perpendicular; alſo let m and n be the Sine and Coſine of Incidence, which in the ſame Ray muſt be always the ſame. Then we ſhall have (according to what is premis'd) $1 : e :: \overline{\frac{1}{4}}|^{x} (= d^{x}) : ed^{x}$ the Sine of the Difference of Incidence and Refraction at E, whence $m\sqrt{1 - e^2 d^{2x}} - ned^{x} =$ the Sine, and $n\sqrt{1 - e^2 d^{2x}} + med^{x} =$ the Coſ. of FED, and $n\sqrt{1 - e^2 d^{2x}} + med^{2x} : (\mathrm{ED})\ 7x :: 1 : \frac{7x}{n\sqrt{1 - e^2 d^{2x}} + med^{x}}$ EF; and in like manner $\mathrm{DF} = \frac{7mx\sqrt{1 - e^2 d^{2x}} - 7nxed^{x}}{n\sqrt{1 - e^2 d^{2x}} + med^{x}}$ from which it appears, that, at any given Height, the Tangent and Subtangent of the Curve become given; but $\frac{7m\dot{x}\sqrt{1 - e^2 d^{2x}} - 7ne\dot{x}d^{x}}{n\sqrt{1 - e^2 d^{2x}} + med^{x}}$ the Fluxion of the Ordinate DA, does not, that I can find, admit of a Fluent, either in finite Terms or by means of Logarithms, nevertheleſs at any conſiderable Height above the Earth's Surface, as 47 or 48 Miles: the Quantities $7ne\dot{x}a^{x}$ and med^{x}, being inconſiderable in reſpect of the others, may be rejected, and then the Fluxion becomes $\frac{7m\dot{x}}{n}$ and Fluent $\frac{7mx}{n}$ ∵ therefore, the Angle of Incidence being known from the given one of Refraction, the Ratio of their Sines being (according to the Experiments of Mr. *Hawkſbee*) as 1000000 : 999736; if at A the Angle GAD be made = Complement of Incidence, G will be the Place where the Ray enters the Atmoſphere.

THANKS are given to the ingenious Contributors to *this* DIARY, for their kind Aſſiſtance and Encouragement; and they may be aſſured, that nothing, in the Power of the AUTHOR, ſhall be wanting to promote uſeful Knowledge and Science: For, as all the Knowledge we have of Nature depends upon Facts, we muſt call *Arithmetic* and *Geometry* to our Aſſiſtance, or reſt ſatisfied with mere Conjectures, which an enquiring Mind can never do: The AUTHOR, therefore, humbly deſires the farther Continuance of their worthy Contributions, as may enable *him* to carry on this Work to the general Satiſfaction of *Them* and the Publick: And that the *Schemes* may be drawn as perfect as poſſible; and all the Equations brought out in Numbers, in order to facilitate his Labour in collecting and compiling the Work. And laſtly, that they will ſend their Letters Time enough to come to Hand before the firſt Day of *May* 1764, directed for THOMAS PEAT, School-maſter and Surveyor, in *Nottingham* (Poſt paid).

Nottingham, July 12, 1763.

ANSWERS to the ÆNIGMAS in the laſt Year's DIARY.

1. SLEEP.
2. DEATH.
3. A FAN.
4. A BOOK.
5. A PARALLEL LINE.
6. A CIRCLE.
7. A CHIMNEY-SWEEP.
8. A WEAVER'S SHUTTLE.

All the Ænigmas anſwered in a Complaint, addreſſed to Miſs *L*———, upon her leaving *Nottingham*, by Mr. *Robert Storks*.

Attend, dear Nymph, while thus, devoid of Art,
Theſe Lines preſent the Language of my Heart!
How great's my Woe ſince you from hence are gone!
With anxious Care I toſt till your Return!
How have the CIRCLing Hours uneaſy paſt 6
Since with your Company I have been bleſt!
In flowery Meads, where Innocency reigns,
We've read a BOOK, or ſung in rural Strains; 4
Then I with Rapture on your Charms have gaz'd,
The more I look'd, the more I ſtood amaz'd!
'Till, quite tranſported with the Pow'r of Love,
In mental Accents did your FAN reprove; 3
In thoſe lov'd Scenes, how pleaſant, how ſerene
The Minutes paſt, as they had never been!
Time like a SHUTTLE took its rapid Flight, 8
When running PARALLEL with ſuch Delight! 5
But ſad Reflexion wakens ſolid Woe;
From Joys now paſt my preſent Sorrows flow:
Penſive on *Trent's* fair Margin now I rove,
Or view the Beauties of the ſmiling Grove;
The rural Objects all yield no Delight,
Since my dear *L*——— is baniſhed from my Sight!
O DEATH, more lenient than the Woes I feel, 2
Or pointed Dagger of obdurate Steel!
My Woes redreſs; — or, Time, my Peace reſtore,
And bring fair *L*——— to *Nottingham* once more:
While ſhe's away, to Peace I bid adieu;
For, 'SLEEP or 'wake, my Sorrows ſtill purſue. 1
A CHIMNEY-SWEEPER I'd much rather be,
Than live in Bondage, *Cupid*, unto thee!

Mr. *John Pearſon*, School-maſter, ſent the following Anſwer to all the Ænigmas.

Come, *Stella*, while the giddy Crowd their Hours
In Mirth miſpend, and waſte their golden Prime;
Friendſhip unPARALLEL'd, my Love, be ours, 5
And BOOKS and Solitude employ our Time. 4
The FANning Breeze, the ſcorching Summer's Sun, 3
And howling Tempeſts, this ſad Leſſon give;
The Glaſs of Time is ever on the run,
And dying Seaſons teach us how to live!
Not to return th' unheeded Moment flies;
Life, like a SHUTTLE, quickly poſts away: 8
E'en while I ſpeak, ſome trembling Mortal dies,
And turns again to native Duſt and Clay.
Dear lovely Maid, with you ſo muſt it be,
Thoſe Eyes ſhall ſhine — that Face ſhall charm no more;
No more this tender Heart ſhall beat for thee,
Nor theſe fond Eyes ſhall gaze thy Beauties o'er!
How many, in one CIRCLing Year, does DEATH 6, 2
From all their Hopes and Expectations ſweep! 7
Thouſands unnotic'd have reſign'd their Breath,
And clos'd their Eyes in everlaſting SLEEP! 1
Be ours the Taſk, in Time to ſeek that Reſt,
Beyond this brittle Life, where Virtue, Truth,
And never-dying Love alone are bleſt
With Joys immortal and eternal Youth!

A TALE, founded on a real Incident, wherein the Ænigmas in laſt Year's Diary are anſwered, by Mr. *Henry Green*, of *Nottingham*.

Young *Corydon*, a happy youthful Sage,
In early Life had read fair Wiſdom's Page;
True Virtue waken'd in his op'ning Mind,
And Science beams with ev'ry Art refin'd:
BOOKS, Men, and Things, he clearly underſtood, 4
And to be wiſe, he knew, was truly good:
Swiſt as the SHUTTLE, Merit rais'd his Name, 8
And ſoon he ſparkled in the Liſt of Fame;
Bleſt with Content in his lone rural Seat,
No PARALLEL he found amongſt the great. 5
Charming *Lucinda* (nought but Truth we tell)
Came from a Grove fairer than CAMBERWELL, *Rebus*
Enrich'd with Virtue, fraught with ev'ry Grace,
The Beauties of her Mind outſhone her Face:
This blooming Nymph young *Corydon* approv'd,
He gaz'd, admir'd, and in the End lov'd.
Soft Tales of Love he whiſper'd to the Fair,
And ſhe indulgent lent a liſt'ning Ear;
Reſponſive Strains flow'd from each yielding Heart,
Such Love what Pity aught but DEATH ſhould part! 2
1

This youthful Pair oft ſpent the CIRCLing Hours 6
Where cooling Breezes FAN the Love-fraught Bow'rs; 3
Or Hand in Hand purſue the flow'ry Way
Where happy Woodlands chant the rural Lay.
One Summer's Eve, when *Sol* withdrew his Light,
And *Luna* ſhone pale Empreſs of the Night;
All things were huſh'd, and Nature ſeem'd to SLEEP 1
Save the cool Streams that thro' the Valley SWEEP; 7
Hapleſs beneath a trembling Poplar's Shade,
The tim'rous Youth enclaſp'd the bluſhing Maid:
An envious Log did at her Feet rebound,
And, lo! the Fair-one tumbled on the Ground!
Sad Tale indeed! — The Sequel we forbear;
But Truth and Honour *Innocence* will clear:
Yet ſavage Ruſtics, pleas'd with doing wrong,
With ev'ry Breath vile Slander will prolong.

After the ſame Manner they were all, or moſt of them, anſwered by Mr. *Samuel Becken*, Mr. *John Ellet*, Mr. *Stephen Hartley*, Mr. *Tho. Harris*, Mr. *Steph. Hodges*, *Jacas de Epſom*, Mr. *Iſaac Peat*, Mr. *Will. Swift*, Mr. *T. Vaughan*, Mr. *Gervaſe Walker*, Mr. *T. Wilſon*, Mr. *W. Wyld*, and others; which cannot be inſerted, for Want of Room; therefore deſire to be excuſed on that Account, and proceed to the

New MATHEMATICAL QUESTIONS propoſed to be anſwered in the next Year's DIARY.

(1) Queſt. 253, by Mr. *William Taylor*, of *Eckington, Derbyſhire*.

A Gentleman ſhared a certain Sum of Pence amongſt three poor People, namely A, B and C, in the following Manner: As oft as he gave 1, 2, 3, 4 &c. at a Time to A, he gave 1, 4, 9, 16 &c. at a Time to B, and 1, 8, 27, 64 &c. at a Time to C: Now the Sum of A's and B's Share was $\frac{3}{14}$ of C's Share. Requir'd each Perſon's Share, and the Sum of all?

(2) Queſt. 254, by Mr. *Stephen Hartley*, of *Sowerbybridge*.

Given the Sum of two Numbers = 24, the Sum of their Squares, when taken from the Sum of their Cubes, is = 3448. Query, the Numbers by a Quadratic Equation?

(3) Queſt. 255, by Mr. *Tho. Barker*, of *Wiſſet*, near *Haleſworth, Suffolk*.

$$\text{Given}\left\{\begin{array}{l} m+w+x+y+z = 204 \\ w^2-x+y-z \,.\,.\, = 79 \\ wz+w+z \,.\,.\,.\,.\, = 23, \\ xy+wz \,.\,.\,.\,.\,.\,.\, = 1555 \\ my-x+wz \,.\,.\,.\, = 7618 \end{array}\right\}$$

Query, the Values of *m*, *w*, *x*, *y* and *z*; with the Manner of Inveſtigation?

(4) Queſt.

(4) Queſt. 256, by Mr. *Samuel Beeken*, of *Thorney Abby.*

A Gentleman was indebted to two Perſons, A and B, to whom he owed each an equal Sum of Money, which he diſcharged as follows: to A, he paid 8 £. the firſt Payment; 12 £. the ſecond; 16 £. the third; and ſo continued increaſing 4 £. every Payment: now B, at his firſt Payment, received but 1 £. the ſecond 4 £. the third 9 £. increaſing according to the Square of the Number of Payments: Query, what he owed each Perſon, and the Number of Payments required to diſcharge the Debt?

(5) Queſt. 257, by Mr. *Rich. Spakeman*, of *Lately-Common, Lancaſhire.*

Given the Radius of a Sector of a Circle 20, and the Angle 40°, to find the Area of the greateſt inſcribed Sector, when the angular Point is in the Middle of the Arch of the given Sector?

(6) Queſt. 258, by Mr. *John Eadon*, Writing-maſter, at *Sheffield*

Given the Diagonal of the Fruſtum of a Cone $= 50$. and the difference of the Diameters $= 10$; required its Dimenſions when its Content is a Maximum?

(7) Queſt. 259, by Mr. *Tho. Robinſon*, of *Biddick*, near *Durham*

There is a Parabola, whoſe Parameter is 80 Inches, and an Elipſis whoſe tranſverſe Diameter is 40, the conjugate Diameter 30; now the Parabola and the Elipſis are joined together at their Vertexes; It is required to draw a Line which ſhall be a Tangent to both Curves, with the Length thereof?

(8) Queſt. 260. by Mr. *Geo. Brown*, Teacher of the Mathematics, on *Portſmouth Common.*

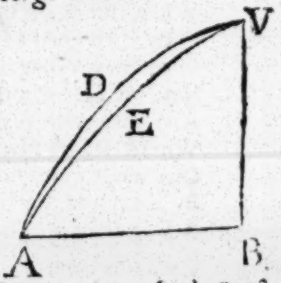
In the Trapezium ABCD, there is given the Sides $AB = 87$, $BC = 44$, $CD = 55$, $DA = 64$, and the Angle $B = 58°$. Required the Dimenſions of the greateſt inſcribed Elipſis?

(9) Queſt. 261, by Mr. *John Eadon.*

The Ratio of the Tranſverſe to the conjugate Axis of a prolate Spheroid, being as 5 to 4, and the Sum of the Conjugate and Height of a Segment, cut perpendicular to the tranſverſe $Axis = 40$; Required both the Axis; as alſo the Segment's Height, when the Solidity's the leaſt poſſible?

(10) Queſt. 262, by Mr. *George Brown.*

Suppoſe $ax^2=y^3$ the Equation of the Curve VEA, whoſe Length is 100; and $px=y^2$ the Equation of the Curve VDA, V the Vertex of both; Required to find VB and BA, when the Curve VDA is a Maximum?



(11) Queſt. 263, by Mr. *Timothy Drury*, of *Great Houghton*.

A String 4 Feet long, is juſt capable of ſuſtaining a Weight of 14 Ounces; now ſuppoſing a Weight of 6 Ounces fixed to the End of it, and whirl'd round (the other End in your Hand) it is required to find the Time of a Revolution, when the Tenſion of the String is a Maximum?

(12) Queſt. 264, by Mr. *Charles Wildbore*, Philo. Mathemat.

In a Curve whoſe Obdinate is $7x$, and Tangent $n\overset{7x}{\overline{\sqrt{1-c^{-}\,d^{-x}}\,|+\overset{x}{\mathrm{med}}}}$ to find the Abiſciſſa, and Rectification, by Means of circular Properties and Logarithms; being the Curve formed by the Rays of Light (vide p. 39).

New ÆNIGMAS, to be anſwered the next Year.

(1) Ænigma 183, by Mr. *William Wylde*, of *Otley*.

Ingenious Bards, who in deep Myſt'ry deal,
To the expecting World my Name reveal:
Nor be aſham'd to own me for your Friend;
On Innocence itſelf I oft attend,
To conſcious Guilt ſometimes a Viſit make
And, by th' Excurſion, force it Truth to ſpeak.
   Short is my Sway, yet abſolute my Reign;
I o'er the regal Race an Empire gain;
Aw'd by no Rank, confin'd to no Degree:
The Prince and Peaſant are alike to me.
   Deſponding Swains exult when I appear;
With hope of Conqueſt o'er the flying Fair!
   No human Art my Preſence can exclude,
For I with Eaſe on either Sex intrude:
At midnight Hours—in Revels ſeen to rove,
Sport with the Lovers, and their Charms improve:
A brilliant Gem, add a ſuperior Grace
To native Beauty, beaming round the Face:
No Strokes of Art ſuch Sweetneſs e'er diſplay'd,
As I have to the human Race convey'd:
View well this Portrait, and you ſoon will find,
A ſecret Emanation of the Mind.

(2) Ænigma 184, by Mr. *Nathaniel Peat*, from *Wirkſworth*.

Why *Gents!* of Me you make no Mention,
Am I not worthy your Attention?
Thus overlook'd, methinks 'tis hard!
When things *leſs* uſeful gain Regard.
   By each good Houſewife I'm well known,
In country Villages and Town;
Nay, ev'n at Court, I've often waited,
And been with royal Dainties ſated:
Where (Rabit-like) I'm often ſeen
One while quite fat; anon as lean.
By Sluts and Slatterns much neglected,
A Dog than me, is more reſpected!

But, tho' thus held in low Eſteem,
Your niceſt Feaſts wou'd nauſeous ſeem;
Where Neatneſs, and Decency reign
I'm moſt approv'd, and oft'neſt ſeen:
Tho' honor'd by the cleanly Dame,
To ſome I prove a Badge of Shame;
When *Buſy-bodies* me aſſail,
I'm hung at the Uſurper's Tail.
  Young *Roger* came the other Day,
To froward *Nan*, his Court to pay;
To prove ſhe he'd him in Diſgrace,
She threw *me* ſtraight in *Roger's* Face!
O'ercome with Shame, the *Lubbard* flies
With Noſe beſmear'd, and watry Eyes;
And vow'd, he ne'er would ſpeak to more
Such an ill natur'd ſaucy W——e!
  May ſuch *diſhonor* wait on them,
Who favor not, nor tell my Name.

(3) Ænigma 185, by Mr. *Gervaſe Walker*.

Of various Sizes, various Stuff; both ſoft and brittle, ſmooth and rough,
  In various Shapes I'm made;
And am for various Ends deſign'd; to ſerve, and ev'n improve Mankind,
  Arts, Sciences and Trade.
The merrieſt Feaſt, moſt tragic Scene; the greateſt Truth and Falſhood ſeen,
  The meereſt Trifle, the moſt us'd:
The Cauſe of Laughter, and of Grief: Afflictions Eaſe, the Sick's Relief,
  Are out of me produc'd.
'Tis true; I am no real Creator; yet I am an apparent MATER,
  With ſmall but teeming Womb;
Which is with *plaſtic* Matter fraught; and whence, by ſkilful Doctor brought,
  All *Triſtram Shandies* come.
My Offspring's of the roſy Hue; and of the negro Species too;
  Tho' oft'ner one than t'other;
And, I with Nature ſo agree—you'll rarely both Complexions ſee
  Produc'd from the ſame Mother.
'Twould be impoſſible to name, half what as Children I might claim,
  Nor, indeed does Man need'em:
Nay, was I to name one in ten, your Time and Patiece, even then
  Would not permit you read'em.

(4) Ænigma 186, by Mr. *Iſaac Peat*, from *Aſhleyhay*, *Derbyſh.*

As all Creatures by Breath their Beings ſuſtain,
So I, to my Being acknowledge the ſame:
Tho' you'll ſay I'm a Monſter; yet, to ſpeak the plain Truth,
My Eye's in my A—e; and my A—e is my Mouth.
I am loved the moſt, by thoſe moſt abuſe me,
For, the more they do love me the worſer they uſe me.
No Hare in the Field can run faſter than I,
And, as ſwift in the Air as a Bird I can fly:
I'll give you one Hint more; I ſeldom appear,
But at a particular Time of the Year.

(5) Ænigma 187, by Mr. *S. Hodges*, of *Althorp*, near *Northampt*.

Ingenious Bards, I pray my Name explore,
Tho' ne'er appear'd in Maſquerade before :
My Native-place is in the Torrid Zone,
Tho' I in *Albion*, by the Great, am known.
My beautious Offspring's very ſtrangely bred,
Some ſever'd from my Body, ſome my Head.
Like *Salamander*, I'm incircl'd in,
With curling Flames, but none to touch my Skin.
I'm dreſs'd in noble Armor, all the Year,
With pointed Darts, I on my Guard appear.
Grand is my Title, Noble is my Name ;
I oft appear with Monarchs of great Fame :
Tho' great my Fame, yet ſhort my Life appears,
'Tis never more than three revolving Years.
When in our Prime, ſome of our Tribes in Green,
And ſome in gaudy Scarlet oft are ſeen.
When we appear with Nobles of Renown,
We're grandly gilded ; wear a royal Crown :
Yet, ne'er ſo happy, ne'er ſo ſweetly bleſs'd,
As when by *Sol's* all cheering Rays careſs'd !
I, with the *Peaſant*, ſeldom do appear,
In curious Gardens, you will find me there ;
There, we appear all ſtately in a Row,
With Curves, whoſe Properties, but few Men know.
I'm always honor'd with the higheſt Claſs,
For none in Grandeur can my Tribe ſurpaſs:
But Fate at laſt, thoſe that do me careſs,
Diſſect, and torture, ſuch I can't expreſs !
From off my Head, they pull my royal Crown,
Regardleſs of the Favors I have ſhown :
Stript of my Grandeur, I become their Slave,
And ſoon interred in a living Grave.

(6) Ænigma 188. By Mr. *John Palmer*, Schoolmaſter, at *Wickham* in *Kent*.

On Beauty's plains, ye Fair, I deign to ſmile,
Tho' not a Native of th' enchanting Iſle,
As *Luna*, bright from *Sol's* refulgent Beams,
On earthly Tribes with borrow'd Luſtre gleams :
So I, both round and dark, no Luſtre boaſt,
'Till borrow'd from ſome fair and lovely Coaſt :
There dignify'd, the faireſt Scene adorn ;
In Rank high plac'd, where Beauty's bright as Morn.
The enamor'd Swain, with Envy burns to ſee,
Charms him deny'd, and yet poſſeſs'd by me :
Tho' Truth once known, he'll find I'm but a Bait
T'allure his Eye ; his Heart to captivate.
The ſage Obſerver eaſily may ſee
In me a Type of Female Vanity :
With well feign'd Bliſs I *Delia's* Boſom warm,
And add illuſive Luſtre to each Charm;

From Toylett's Shades I ſpring, firſt Captive bound,
Then ſpread my magic Charms, profuſe around:
In Royal Courts, I free Admiſſion have,
But oft, O dire Diſgrace! an *Harlot's* ſlave;
In Maſquerade, I no Performance boaſt;
Am there eclips'd, and all my Beauty's loſt:
Prophetic *Bards*, wrap'd in immortal Fame,
Take off the Maſk, and ſpeak aloud my Name.

(7) Ænigma 189, by *Ænigmaphilus*:

To tell to a Tittle my Time it would loſe,
How many do live by the Sweat of my Brows;
And yet, what is ſtrange, it is very well known,
The Sweat I looſe for them is none of my own:
I'm hurry'd about, that it muſt be confeſs'd,
I ſcarce can have Leiſure to take a Night's Reſt;
I often am dirty, as often am clean,
And in twenty-four Hours, I am fat and I'm lean:
I neither do follow the Plow nor the Cart,
And yet, in that Service, I do the beſt Part:
I'm hot and am cold, tho' I take it by Turn,
Like thoſe in a Fever I often do burn.
I'm valu'd by the Rich, but ſet by the more
When I make my Appearance 'mongſt thoſe that are poor:
To tell you the Truth, what makes me to ſweat,
Is not an *Ætnean*, but deſcending Heat;
If it were not for mine, and my dear Siſter's Sake,
You wou'd be (my good Friends) all as lean as a Rake.

(8) Ænigma 190, by Mr. *Thomas Sadler*.

In Architecture *Wren* the Baſis laid,
The Power of Nature *Newton* hath diſplay'd:
Fam'd *Albion's* Iſle all Nations may out-vie,
For Arts and Science and Philoſophy.
From Trees, from Beaſts, and Bowels of the Earth,
And Man's great Genius, I derive my Birth;
My Shape, and Form; which Way ſhall I deviſe
For to deſcribe and not give you Surprize?
Goliah's Spear (if like a Weaver's Beam)
An Emblem of ſome Part of me might ſeem:
What Monſters on the Banks of *Nile* are found,
And ravage on *Numedia's* barren ground:
Like them I've Horns, which point Eaſt, Weſt, North, South,
And between which is an enormous Mouth:
Sometimes indeed, where Nymphs and Swains reſort
I have appear'd aamidſt their jovial Sport.
There I turn Tumbler, to divert each Fair,
And pleaſe each Swain with antic Tricks, O rare!
Thus for a While, I do with Numbers play,
'Till home decrepit I am borne away.
There lie regardleſs of Man's Thought or Care,
But hold, enough——my Name you'll ſoon declare;

FINIS.